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PSYCHOMETRIC PERFORMANCE OF THE ARABIC VERSIONS OF THE CANCER BEHAVIOR INVENTORY-BRIEF AND THE FUNCTIONAL ASSESSMENT OF CANCER THERAPY-BREAST IN SAUDI ARABIA

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PSYCHOMETRIC PERFORMANCE OF THE ARABIC VERSIONS OF THE CANCER BEHAVIOR INVENTORY-BRIEF AND THE FUNCTIONAL ASSESSMENT OF CANCER THERAPY-BREAST IN SAUDI ARABIA

A DISSERTATION

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF DOCTOR OF PHILOSPHY IN NURSING

THE UNIVERSITY OF TEXAS HELATH SCIENCE CENTER AT HOUSTON

SCHOOL OF NURSING

BY

MAAIDAH M. ALGAMDI, M.S.N

MAY, 2016

The University of Texas Health Science Center at Houston
School of Nursing
Houston, Texas

March 21, 2016
Date

To the Dean for the School of Nursing:

I am submitting a dissertation written by Maaidah Algamdi and entitled "Psychometric Performance of the Arabic Versions of the Cancer Behavior Inventory-Brief and the Functional Assessment of Cancer Therapy-Breast in Saudi Arabia." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Nursing.

Sandra K. Hanneman
Sandra K. Hanneman, PhD, RN, FAAN
Committee Chair

We have read this dissertation
and recommend its acceptance:

Diane Wardell

Omalkhair Abulkhair

Accepted

Lorraine Fowler
Dean for the School of Nursing

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I wish to express my gratitude first to God, who guides me and gives me patience and faith that "The God never wasted wages of the best work." My parents, the wonderful gift from God – you supported me with prayers every single morning of the years I was here in the United States. Thank you to all of my family members who stand beside me at difficult times and in moments of frustration; thank you for everything. When I entered the United States for the first time, my brother Abdullah was with me. In good and bad times, he was always there; I am thankful for everything he did for me.

My true friends, I am more than lucky to have you in my life. We share good and bad times together, support each other, and stand as one family when we are without our families. I appreciate being with me my lovely friends.

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Maaidah M. Algamdi

Psychometric Performance of the Arabic Versions of the Cancer Behavior Inventory-Brief and the Functional Assessment of Cancer Therapy-Breast in Saudi Arabia

May, 2016

Abstract

Background: Arabic is the mother tongue of 26 countries, including Saudi Arabia where cancer is the fourth leading cause of death. Cancer is a sensitive issue in the Arabic population and a clear understanding of patients' perceptions of self-efficacy for coping with cancer and quality of life helps assess interventions designed to facilitate optimal patient outcomes. In preliminary studies, the Cancer Behavior Inventory-Brief (CBI-B) was translated and back translated between English and Arabic, and reviewed for translational validity by an expert panel. The Arabic version of the CBI-B (CBI-BA) had acceptable evidence of translational validity with an overall translational validity index of 0.83. The CBI-BA was tested for evidence of internal consistency reliability with Arabic-speaking patients with cancer in Houston, Texas. Cronbach's alphas were ≥ .76, indicating acceptable evidence of reliability.

Purpose: The purpose of this study was to develop psychometrically sound and culturally acceptable measures of self-efficacy for coping with cancer and quality of life for the Arabic-speaking population.

Methods: Using a cross-sectional design, Arabic-speaking patients with cancer were recruited from two oncology centers in Riyadh, Saudi Arabia. All patients completed the CBI-BA; a randomly selected subsample participated in cognitive interviews to

determine semantic equivalence of the CBI-BA with the CBI-B. From the total sample, a subsample of women with breast cancer also completed the Arabic version of the Functional Assessment of Cancer Therapy –Breast (FACT-BA). Psychometric performance of both instruments was assessed for internal consistency reliability using Cronbach's alpha (α) and construct validity using exploratory factor analyses, using principal axis factoring, with both orthogonal and oblique rotations.

Results: Internal consistency estimates were acceptable for the CBI-BA (α = .79 -.80) and the total FACT-BA (α = .88) scales, but variable for the FACT-BA subscales (α = .63 - .89). Exploratory factor analyses showed evidence of construct validity for the CBI-BA; one factor was derived, compared with four in the CBI-B. Cognitive interviews indicated satisfactory semantic equivalence of the CBI-BA with the CBI-B. The Breast Cancer subscale of the FACT-BA had inadequate α and a low response rate, which precluded testing construct validity. The Arabic version of the general FACT-G scale (FACT-GA) had four factors, according to expectation, in Arabic women with breast cancer.

Conclusions and Implications: The CBI-BA has adequate evidence of translation validity, internal consistency reliability, construct validity, and semantic equivalence to measure self-efficacy for coping in Arabic-speaking patients with cancer. The FACT-GA, but not the FACT-BA, has adequate evidence of internal consistency and construct validity in Arabic-speaking women with breast cancer to measure quality of life. Demonstration of adequate psychometric performance of these instruments is expected to advance research with Arabic (1) patients with cancer by providing a means to assess self-efficacy for coping with cancer, and (2) women with breast cancer by providing a

means to assess the patient-centered outcomes of self-efficacy for coping with cancer and quality of life.

Key words: Arabic, CBI-BA, cognitive interview, FACT-BA, quality of life, reliability, self-efficacy for coping, semantic equivalence, validity

TABLE OF CONTENTS

Summary of the Study

The dissertation involves three major parts: proposal, manuscript reporting the findings, and appendixes. The proposal was approved by the Dissertation Committee. The manuscript, "Psychometric performance of the Arabic versions of the Cancer Behavior Inventory-Brief and the Functional Assessment of Cancer Therapy-Breast in Saudi Arabia," contains the dissertation findings. The appendixes contain two published articles (Appendixes A and B), results of the factor analyses that are not reported in the manuscript (Appendix C), translation certificates (Appendix D), and the author's curriculum vitae (Appendix E). The articles in press were done as part of the PhD program coursework and the data served as preliminary support work for the dissertation.

The study used a cross-sectional design to test the psychometric performance of the Arabic versions of the Cancer Behavior Inventory-Brief (CBI-BA) and the Functional Assessment of Cancer Therapy-Breast (FACT-BA) among Arabic patients with cancer in Saudi Arabia. Randomly selected participants participated in cognitive interviews to determine the semantic equivalence of the CBI-BA with the CBI-B. The specific aims were to evaluate the evidence for (1) internal consistency reliability of the CBI-BA in the Arabic cancer population and in Arabic women with breast cancer using Cronbach's alpha (α); (2) validity of the CBI-BA in the Arabic cancer population and in Arabic women with breast cancer using exploratory factor analysis (EFA) with principal axis factoring (PAF) and varimax and promax rotations; (3) internal consistency reliability of the FACT-BA among Arab women with breast cancer using α; and (4) validity of the FACT-BA among Arab women with breast cancer using EFA with PAF and varimax and

promax rotations. The aims were achieved with a total sample of 443 patients with cancer, of whom 168 were women with breast cancer.

Two preliminary studies were conducted that provided the foundation for the dissertation: Arabic translation of the CBI-B and pilot testing of the CBI-BA and the FACT-BA in Houston, Texas, USA. The findings from these studies are in Appendixes A and B.

There were two deviations from the proposal approved by the Dissertation Committee. First, 443 participants were recruited instead of the planned 481, the latter based on an unknown, but projected, 30% attrition rate. The actual attrition rate was 1.2%, and the obtained sample size exceeded the 370 participants needed to meet the 10:1 subject-to-item ratio recommended for factor analysis. However, fewer women with breast cancer were recruited than expected (n= 168), so the subject-to-item ratio was 6:1 for the FACT-BA factor analysis. Second, the 14-item CBI posted for public use was used for the preliminary studies and, thus was proposed for testing the related dissertation specific aims. This version did not perform according to expectation, and the 12-item version (Heizmann et al., 2011) also was subjected to factor analyses. The optimal solution is reported in the manuscript, "Psychometric performance of the Arabic versions of the Cancer Behavior Inventory-Brief and the Functional Assessment of Cancer Therapy-Breast;" the solutions for multiple exploratory factor analyses, with and without the Breast Cancer subscale, using orthogonal and oblique rotations are included in Appendix C to provide an audit trail.

PSYCHOMETRIC PERFORMANCE OF THE ARABIC VERSIONS OF THE CANCER BEHAVIOR INVENTORY-BRIEF AND FUNCTIONAL ASSESSMENT OF CANCER THERAPY-BREAST

A DISSERATATION PROPOSAL

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Specific Aims

Exploring self-efficacy for coping (SEC) with cancer and quality of life (QOL) in Arab populations would be beneficial for understanding attitudes toward cancer and its influence on coping abilities and QOL. Self-efficacy is conceptually defined as an individual's belief in his/her abilities to perform a specific behavior under challenging conditions (Bandura, 1977), which can be measured in cancer populations using the Cancer Behavior Inventory-Brief (CBI-B) (Heitzmann et al., 2011). However, reliable and valid instruments for use with Arabic-speaking cancer patients are not available. Using World Health Organization (WHO, n.d) guidelines, the principal investigator (PI) translated the CBI-B from English to the Arabic language (CBI-BA) (Algamdi & Hanneman, 2014). In the proposed study, the PI will evaluate the psychometric performance of the translated version in Saudi Arabia.

Culture has a complex influence on behaviors because it provides a source of information from which to develop SEC with cancer (Bandura, 2002; Oettingen, 1995), and culture heavily influences individuals' abilities to cope with their illness. As such, not only language, but also cultural factors must be considered when measuring SEC. To validate semantic equivalence of the CBI-BA in the proposed study, cognitive interviewing will be done with Arabic-speaking patients who have been diagnosed with cancer. Semantic equivalence would indicate that the CBI-BA reflects the exact meaning of the original CBI-B in the context of the Arabic culture. The PI's long-term goal is to use the CBI-BA with Saudi women with breast cancer, but patients diagnosed with all types of cancer will be recruited in the proposed study to test the instrument's psychometric performance in the larger cancer population.

Heitzmann et al. (2011) stated that exploring SEC is important because it has a significant influence on overall QOL of the cancer population. In addition, QOL is a major indicator of health condition among cancer patients (Lee et al., 2013). WHO (1997) defined QOL as "individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" (p. 1). Determinants of QOL include physical functioning, general health, pain, fatigue, and well-being (Theadom, Cropley, & Humphrey, 2007). Self-efficacy has a positive effect on enhancing QOL over time, especially for those undergoing cancer treatment (Cheng et al., 2012). Therefore, measuring QOL of Arabic women with breast cancer is important for determining how their condition influences their lives. QOL of women with breast cancer can be measured using the Functional Assessment of Cancer Therapy-Breast (FACT-B) (Brady et al., 1997). An Arabic version of the FACT-B is available, but evidence of reliability and validity of the Arabic version of the FACT-B (FACT-BA) has not been reported. Hence, the psychometric properties of this instrument also need to be estimated.

The investigator's future plans include testing interventions to improve SEC and QOL of women with breast cancer in Saudi Arabia. If the CBI-BA and FACT-BA demonstrate acceptable psychometric performance, the instruments will be used in future research. The findings from the proposed psychometric testing will inform practice and research of the measurement of SEC in the Arabic-speaking cancer population and QOL of Arabic-speaking women with breast cancer. The purpose of the proposed study is to evaluate the psychometric performance of the CBI-BA and the FACT-BA in the Arabic-speaking cancer population. It is hypothesized that the (1) evidence of reliability for the

CBI-BA and the FACT-BA will be acceptable (Cronbach's alpha ≥ 0.70), and (2) evidence of validity will be demonstrated by the loading of instrument items on factors representing instrument subscales according to theoretical expectations. The **specific aims** are to**:**

Specific aim 1: Evaluate evidence for reliability of the CBI-BA in the Arab cancer population, then in Arab women with breast cancer, by testing evidence of internal consistency using Cronbach's alpha (α);

Specific aim 2: Evaluate evidence for validity of the CBI-BA in the Arab cancer population, then in Arab women with breast cancer, by exploratory factor analysis (EFA) using principal axis factoring (PAF) with varimax rotation;

Specific aim 3: Evaluate evidence for reliability of the FACT-BA among Arab women with breast cancer by testing evidence of internal consistency using α; and

Specific aim 4: Evaluate evidence for validity of the FACT-BA among Arab women with breast cancer by EFA using PAF with varimax rotation.

The findings of this study will help inform research and practice with the Arab cancer population, with a particular focus on women with breast cancer.

Research strategies:

(a) Signifiance

Salim et al. (2009) reported that about 300 million people are citizens of the Arab world. According to One World Nation Online (n.d.), Arabic is the official language of 26 countries distributed across Asia and Africa. In the Middle East, cancer is the fourth

leading cause of death (WHO, 2009). In 1998–2001, cancer cases in Gulf Cooperation Council countries totaled 32,291 (Al-Hamdan et al., 2009), indicating that a reasonable number of Arabic-speaking people may benefit from the availability of valid and reliable instruments to measure SEC and QOL. Moreover, SEC has a substantial impact on overall QOL in cancer populations (Heitzmann et al., 2011), and psychometrically sound measures of SEC and QOL for use with the Arabic-speaking population is expected to facilitate improved care of those with cancer. Cancer has a major impact on QOL, which is an essential factor for describing the health status of cancer populations (Lee et al., 2013).

In brief, cancer influences physical and psychological aspects of people's lives (Stein, Syrjala, & Andrykowski, 2008), not only at the time of diagnosis and treatment but long afterwards as well (Drake, 2012). SEC with cancer appears to predict QOL and increase survival (Yeung, Lu, & Lin, 2014). Therefore, measuring SEC in Arab individuals with cancer could indicate issues they face during their illness and the course of treatment that reflect on their overall QOL. Using a reliable and valid instrument to measure the concept of SEC with respect to language and cultural differences is crucial. On that basis, the intent is to maintain equivalence between English and Arabic measures of SEC. A literal translation of the CBI-B is insufficient; the participant's understanding of instrument items is essential to the validity of the concept(s) being measured with the instrument. Hence, cognitive interviewing will be used as a qualitative determination (Reeve et al., 2011) of participant understanding of each CBI-BA item, and items that are not understood as intended will be reworded.

Culture is a key component of QOL because it explains how people function within their environment (Skevington, 2002). Cancer is considered a stigma among Arab people, and in Arab women, in particular, fear, shyness, and stigma affect attitudes toward breast cancer and coping (Alam, 2006; Amin, Almulhim, & Almeqihwi, 2009; Sarhan, 2009). Coping issues can affect overall QOL including physical, emotional, social, and functional well-being. The characteristics of Arab women with breast cancer differ from those of American and European women; Arab women are often diagnosed at a younger age (AbdelHadi, 2006) with a more advanced stage of cancer (Chouchane, Boussen, & Sastry, 2013). Women with breast cancer experience good or poor QOL based on the level of their SEC; good QOL reflects a high level of SEC, while poor QOL indicates a low level of SEC (Akin, Can, Durna, & Aydiner, 2008; Heitzmann et al., 2011). Arab women, in particular, experience anxiety and shame that affect their attitudes toward breast cancer (Alam, 2006; Amin, Almulhim, & Almeqihwi, 2009; Sarhan, 2009). Such psychological attributes are theorized as adverse influences on QOL and SEC in Arab women with breast cancer. Moreover, cross-cultural measures are essential for use in international studies (Skevington, 2002), and research with Arab populations would benefit from psychometrically sound instruments in the Arabic language.

The purpose of this study is to test the psychometric performance of the CBI-BA and the FACT-BA in an Arabic-speaking sample of people with cancer and women who have been diagnosed with breast cancer. In addition, cognitive interviews with the participants will determine the semantic equivalence of the CBI-BA with the CBI-B. Because there are no known valid and reliable measures for SEC for Arab people with cancer and QOL for Arab women with breast cancer, the proposed study will serve as the

building block for future research using quantitative and qualitative methods to develop and/or test instruments for use in Arab populations.

Conceptual Framework. Figure 1 illustrates the relation between SEC and QOL in people with cancer. Individual characteristics determine responses to cancer diagnosis; these characteristics include knowledge, attitude, culture, and social influences. Responses to cancer diagnosis and treatment influence coping abilities (Lev, 1997). High SEC leads to positive behaviors reflected in high QOL (Heitzmann et al., 2011). On the other hand, low level of SEC influences coping behaviors in a negative manner, leading to poor QOL (Akin, Can, Durna & Aydiner, 2008; Yeung, Lu & Lin, 2014). In the proposed study the PI will measure SEC in Arab people with cancer and QOL in Arab women with breast cancer using the CBI-BA and the FACT-BA, respectively. These measurements are expected to show the nature of the correlation between SEC and QOL, which will be helpful in developing a psychosocial program to improve both SEC and QOL in Arab women with breast cancer.

(b) **Innovation**

The PI translated the CBI-B into the Arabic language using the WHO process for translating instruments (WHO, n.d). The process included forward translation, back translation, use of an expert panel, pretesting, and cognitive interviewing. A psychometrically sound instrument to measure SEC in Arab cancer populations, and especially for women with breast cancer, will facilitate cancer research. Psychometric performance has not been reported for the FACT-B Arabic version.

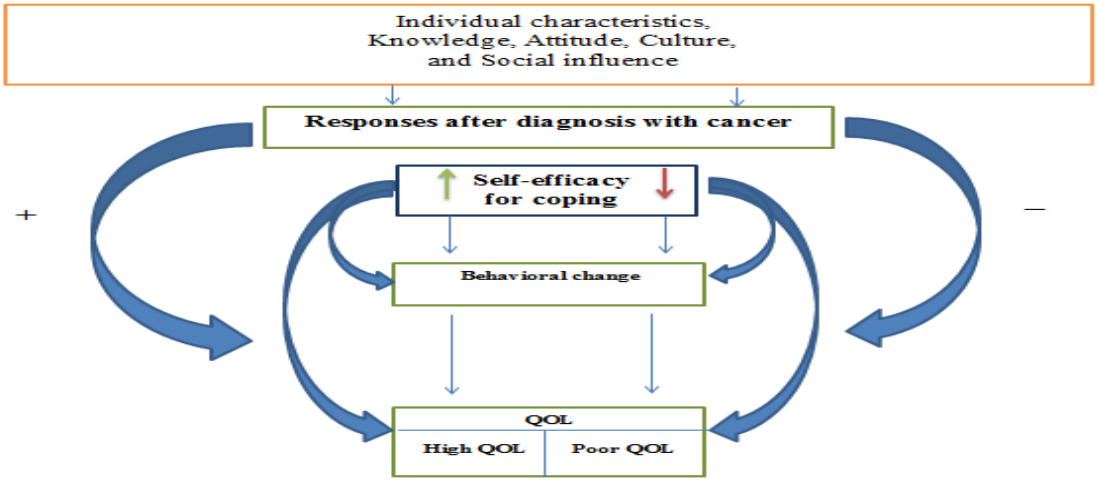


Figure1. Conceptual framework shows the relation between self-efficacy for coping and quality of life (QOL) in patients with cancer.

(c) Approach

Psychometric testing of the CBI-BA and the FACT-BA will be done with Cronbach's alpha for internal consistency reliability and EFA with PAF for construct validity. Furthermore, the semantic equivalence of the CBI-BA will be determined using cognitive interviewing (Reeve et al., 2011) to ascertain participant understanding of each translated item.

Preliminary Studies

Study # 1- Fifty cancer patients who speak Arabic were recruited to test evidence for reliability of the CBI-BA. Forty-seven of them (94%) completed the questionnaire. Cronbach's alpha was .77, suggesting adequate internal consistency evidence (DeVellis, 2012). Of 17 women with breast cancer, 16 of them (94%) completed the CBI-BA and Cronbach's alpha was .78, indicating an acceptable level of internal consistency.

Cognitive interviewing revealed that 5 of 6 participants recommended rewording the word "independence" in the first item to "self-reliance." Additionally, most of the participants found use of the word "cancer" to be bothersome. Therefore, the word "cancer" was changed to "disease." Of the 17 women with breast cancer, 12 (71%) completed the the FACT-BA. Cronbach's alpha was .67, indicating inadequate evidence for reliability. Two items of the FACT-BA had minimal response rates: item 7 in the Social Wellbeing scale and item 4 in the Additional Concerns scale (i.e., Breast Cancer subscale); both are related to sexual issues. After excluding these items, the alpha increased to .91, indicating adequate evidence of internal consistency. Both instruments were revised accordingly. The word "independence" was changed to "self-reliance" in item 1 of the CBI-BA, and the word "cancer" was replaced throughout the instrument with the word "disease." Item 4 of the FACT-BA Additional Concerns subscale was made optional; item 7 in the Social Wellbeing subscale already is optional. Psychometric testing was resumed with these changes in the instruments.

Study # 2 - Evidence for reliability of the revised versions of the CBI-BA and the FACT-BA was tested with another sample of 50 cancer patients, including 13 women with breast cancer. For the revised CBI-BA, 47 patients (94%) completed the instrument; Cronbach's alpha was .77, suggesting acceptable internal consistency. Thirteen women with breast cancer responded to the revised CBI-BA. The Cronbach's alpha was .67, indicating inadequate evidence of internal consistency. Revisions to the CBI-BA did not improve the internal consistency, but did facilitate cognitive understanding of the items by participants. Cognitive interviews indicated that items 5, 10, and 13 required revision. "Putting things out of my mind at times" will be changed to "Talk about things in my

mind at times;" "Seeking social support" will be changed to "Seek support from others such as family, friends, groups, and organizations" with use of a different synonym for the word "support" in Arabic; and "Coping with physical challenges" will be changed to "Coping with physical difficulties."

Reliability of the FACT-BA was tested on 13 women with breast cancer. Cronbach's alpha was .87 for the total scale and .91 after deleting item 7 in the Social Wellbeing scale and item 4 in the Additional Concerns scale. Internal consistency of the instrument was improved after the revisions.

The overall attrition rates were as follows: CBI-BA, 8% and FACT-BA, 7%. Reasons for attrition were missing answers for one or two items on the questionnaire.

Design

Using a cross-sectional design, participants will complete the CBI-BA once and those diagnosed with breast cancer will be asked to also complete the FACT-BA. From the participant list, 30 participants will be selected randomly to be cognitively interviewed about the CBI-BA. The random selection will be done using random assignment software available at http://www.randomizer.org/form.htm.

Sample and Setting

The planned sample size is 370 participants for the CBI-BA (14 items) and the FACT-BA (35 - 37 items) to provide at least 10 subjects per item for factor analysis (DeVellis, 2012; Froman, 2001). Although the overall attrition rate was approximately 8% in the preliminary studies, it is unknown what the attrition rate will be in Saudi Arabia. Allowing for an attrition rate as high as 30%, 481 women will be recruited. A convenience sample of Arabic-speaking adults will be recruited from three oncology

centers located in three hospitals in Riyadh, Saudi Arabia: King Fahad Medical City, National Guard Ministry of Health Affairs, and Prince Sultan Military Medical City. To facilitate recruitment, oncologists will be requested to notify patients of the study at the patient's regular appointment time, and flyers (Appendix A) will be posted in waiting rooms of the oncology centers. The snowball sampling technique (Polit & Beck, 2012) will be used, whereby participants are asked to tell people they know who have cancer about the study.

Study inclusion criteria are age between 18 and 75 years, diagnosed with cancer, and able to read and write Arabic. The exclusion criterion is participant sensory and/or cognitive deficits as determined by inability to communicate verbally and understand verbal instructions.

Instruments

The CBI-B (Appendix B) is a 14-item, self-report, norm-referenced, paper-and-pencil instrument developed to measure SEC of cancer patients (Heitzmann et al., 2011); it takes ≤ 5 minutes to complete. Heitzmann and colleagues reported evidence of adequate internal consistency (Cronbach's alphas .84 - .88). They also demonstrated evidence of construct validity with factor analysis (N=735); the hypothesized four subscales were supported by the loading of all items on a four-factor solution. The subscales of the CBI-B are maintaining independence and positive attitude, participation in medical care, coping and stress management, and managing affect. The CBI-B uses a 9-point, Likert-type scale (1 = not at all confident, 9 = totally confident). The sum of the item scores indicates the level of SEC, with higher scores reflecting a stronger self-efficacy for coping than lower ones (Heitzmann et al., 2011). Based on participant

feedback from cognitive interviewing, as reported in the Preliminary Studies, the revised CBI-BA (also in Appendix B) will be used. Demographic data of age, gender, and type of cancer diagnosis is collected on the CBI-BA for description of the sample.

The FACT-B (Appendix C) is a 37-item, self-report, norm-referenced, paper-and-pencil instrument developed to measure QOL of women with breast cancer (Brady et al., 1997); it takes about 10 minutes to complete. Brady and colleagues reported adequate internal consistency (Cronbach's alpha = .90) and construct validity evidence. Factor analysis (N=295) supported the hypothesized five subscales. The subscales are physical, social/family, emotional, and functional well-being, and additional concerns (breast cancer subscale). The FACT-B uses a 5-point Likert-type scale, scored from 0 (not at all) to 4 (very much). An Arabic version of the FACT-B is available for use. The FACT-BA (also in Appendix C) was revised for the proposed study as discussed under Preliminary Studies.

Data Collection Procedures

The data collection steps are summarized below and detailed in Appendix D. Prior to study initiation, the code number assigned to 30 participants will be randomly selected by computer to select the participants to approach for cognitive interviews. When 10 selected participants have declined participation in the cognitive interviews, replacement code numbers will be selected by computer randomization. Participants assigned the interview study identification codes will be asked to participate in a brief cognitive interview after completion of the CBI-BA. The data collection form for the cognitive interview is in Appendix E.

After introductions, the volunteer will be given the informed consent (Appendix F) document to read and the PI will review the content with the volunteer in Arabic, emphasizing that the information the participant provides will be confidential and used for research purposes only. After consent to study participation has been provided, the participant will be given the CBI-BA to complete. Women with breast cancer will be asked also to complete the FACT-BA. Participants selected for cognitive interviewing will be asked the following questions about each item on the CBI-BA: (a) What did this question mean to you? (b) Why did you select this answer? and (c) Can I rephrase this question to make it easier to understand? If so, how? Participants' responses will be recorded manually and discussed with the co-investigator and a professional translator. The feedback will be used for possible future modification of items that were confusing to participants.

Data Management and Analysis

All data will be de-identified, including paper questionnaires and interview notes, remain in possession of the investigators, and stored in a double-locked room in the advisor's office at the University of Texas Health Science Center at Houston School of Nursing.

Responses to the instruments will be entered into an Excel database and imported into SPSS statistical software (IBM Corp. Armonk, NY). Items on the FACT-BA will be reverse-scored as outlined in Appendix D. Responses from 5 participants will be selected randomly from every consecutive set of 50 participants to verify accuracy of data entry (i.e., 10% of completed questionnaires). If the data entry error rate exceeds 5%, all data will be double-checked for accuracy (EMGO Institute of Health and Care Research, 2013). Data analysis will include descriptive statistics, Cronbach's alpha for internal

consistency, and EFA with PAF for construct validity. Measures of central tendency and dispersion appropriate for the level of data will be computed for the sample demographics and item and total scores for the CBI-BA and the FACT-BA. The distribution of data will be assessed with histogram and the Kolmogorov-Smirnov normality test.

Cronbach's alpha for the CBI-BA will be computed for all participants with cancer, and separately for women with breast cancer (Aim 1). Cronbach's alpha for the FACT-BA will be computed for women with breast cancer (Aim 3). Cronbach's $\alpha \geq .70$ will be considered evidence of adequate internal consistency (Nunnally & Bernstein, 1994).

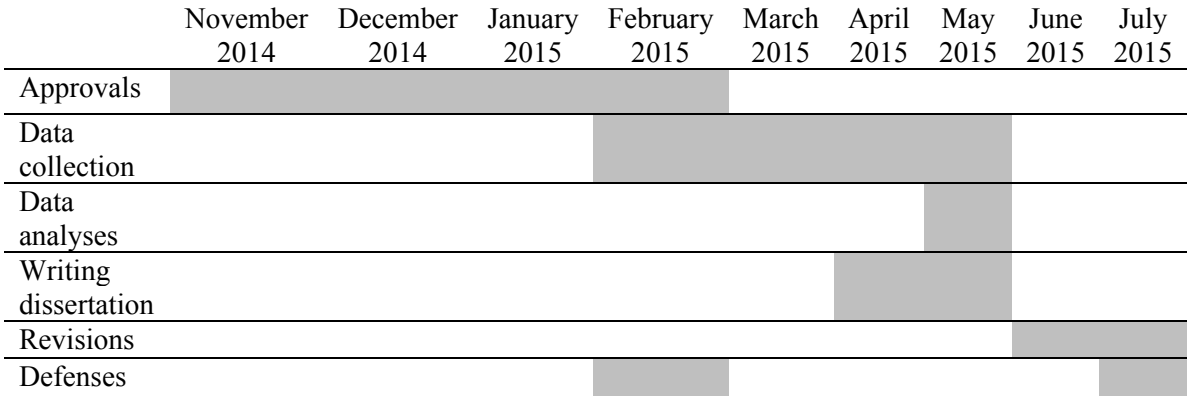
Separate EFAs using PAF with varimax rotation will be conducted for the CBI-BA for all participants with cancer and for women with breast cancer (Aim 2). EFA with PAF and varimax rotation for the FACT-BA will be conducted for women with breast cancer (Aim 4). The scree plot will be used to determine the number of factors extracted. A priori criteria for an acceptable solution include factor loadings $\geq .30$, cross-loadings $> .20$, and ≥ 3 items per factor (Leech, Barrett & Morgan, 2011; DeVellis, 2012). Based on the hypothesized subscales, the results should be a four-factor solution for the CBI-BA and a five-factor solution for the FACT-BA.

The participants' comments from cognitive interviewing will be collated by item and described. Instrument items with more than nine constructive comments will be recommended for future revision. The PI selected nine as the criterion for revision based on the anticipated total of 30 participants interviewed; nine or more comments would indicate that approximately 30% of participants had difficulty with the item. Fewer than

nine constructive comments, together with acceptable explanation of the response choice, will indicate acceptable semantic equivalence (Beck, Bernal, & Froman, 2003) of the CBI-BA with the CBI-B.

Study Timeline

The proposed study is anticipated to take place between February and July 2015 as shown below.



Study Limitations

Women in the Arabian culture are reluctant to reveal personal information (Sarhan, 2009), and female study participants may be hesitant to share their thoughts about cancer. Participants will be assured that confidentiality will be maintained. No personal identifiers will be collected from the participants. The interviewer will be an Arabian female which should decrease anxiety and discomfort of the female participants.

Protection of Human Subjects

Institutional review board approvals of the study from the University and two Saudi hospitals are in Appendix G. The consent dialog will be done on a one-to-one basis in waiting rooms of selected oncology clinics. The participant will have adequate time to

discuss the study with the investigator and review the consent form. The investigator will give a copy of the consent form to the participant and offer additional time for the participant to consider participation in the study. Verbal consent will be obtained from study participants to ensure they understand the purpose of the study and uses of the information they provide. Participants will be free to withdraw at any time and refuse to answer any items on the instrument(s). Verbal consent will be used to avoid loss of confidentiality, the only potential risk to participants. The study consent form will be attached to the instrument(s) as a cover letter to inform the participant of the purpose of the study and explain the role and rights as a participant. By reading the consent and completing the instrument(s), and interview if appropriate, the participant will be giving consent for study participation.

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Appendix A

Recruitment Flyer

Adult Volunteers Needed to Test Arabic Version of Cancer Questionnaire(s)

If your age is 18-75 years

and

you have been diagnosed with cancer,

you are invited to participate in a study to test validity and reliability of one or two questionnaires.

Your participation in the study is appreciated because it could help with research and care of Arabic speaking patients with cancer.

Time commitment: 5 minutes for the CBI-BA and 10 minutes for the FACT-BA (women with breast cancer only)

If you are willing to take a part in the study, please do not hesitate to contact Maaidah Algamdi at

Phone number: 0560091866

Email: Maaidah.Algamdi@uth.tmc.edu

مطلوب متطوعين بالغين لاختبار النسخه العربيه من استبيانات تخص مرضى السرطان

اذا كان عمرك من 18- 75 وقد تم تشخيصك بالسرطان

انت مدعو للمشاركه في دراسه للتحقق من صدق وثبات استبيان او اثنان

مشاركتكم هي محل تقديرنا حيث انها قد تساعد في مجال البحث والرعاية الصحية لمرضى السرطان الناطقين باللغه العربيه

الوقت المطلوب لتعبئة الاستبيانات:عشردقائق لاستبان قياس الكفاءه الذاتيه لمواجة السرطان خمس عشرة دقيقه لقياس نمط الحياة

اذا كنت اوكنتي على استعداد للمشاركه في هذه الدراسه لا تتردد اوتترددين في الاتصال على

معيضه الغامدي

جوال:

0560091866

ايميل:

Maaidah.Algamdi@uth.tmc.edu

Appendix B

The Cancer Behavioral Inventory-Brief and Arabic version of Cancer Behavioral Inventory-Brief

The Cancer Behavioral Inventory-Brief Arabic in English

Please complete the following:

1- Demographics:

Age: _____ Gender: _____ Type of Cancer: _____

2- Questionnaire about cancer patient behavior:

This questionnaire consists of things a person might do when receiving cancer treatment. We are interested in your level of confidence for performance of these things. Be sure that these ratings precisely reflect your confidence whether you did it before or not. Therefore, the rating will reflect your level of confidence in the performance of these things in the present (or in the near future). Please read each numbered item, then rate your level of confidence in the performance of this behavior. Put a circle around the number in the rating scale. If you circle number "1", you mean that you are not at all confident in performing this behavior. If you circle number "9", you mean that you are totally confidant in performing this behavior. The numbers in the middle of the scale show that you are somewhat confidant in performing this behavior. Please rate all items. If you are not sure about certain items, please provide the best rating you can.

	Not Confidant at all			Somewhat Confidant			Totally Confidant		
1- Maintain self-reliance	1	2	3	4	5	6	7	8	9
	Not Confidant at all			Somewhat Confidant			Totally Confidant		
2- Maintain positive attitude	1	2	3	4	5	6	7	8	9
	Not Confidant at all			Somewhat Confidant			Totally Confidant		
3- Maintain sense of humor	1	2	3	4	5	6	7	8	9
	Not Confidant at all			Somewhat Confidant			Totally Confidant		
4- Expressing feelings about the disease	1	2	3	4	5	6	7	8	9
	Not Confidant at all			Somewhat Confidant			Totally Confidant		
5- Talk about things on my mind at times	1	2	3	4	5	6	7	8	9
	Not Confidant at all			Somewhat Confidant			Totally Confidant		
6- Maintain activities (work, home, hobbies, social)	1	2	3	4	5	6	7	8	9
	Not Confidant at all			Somewhat Confidant			Totally Confidant		
7- Try to be calm during treatment and avoid frightening ideas	1	2	3	4	5	6	7	8	9
	Not Confidant at all			Somewhat Confidant			Totally Confidant		
8- Participate actively in treatment decisions	1	2	3	4	5	6	7	8	9
	Not Confidant at all			Somewhat Confidant			Totally Confidant		
9- Ask physician questions	1	2	3	4	5	6	7	8	9
	Not Confidant at all			Somewhat Confidant			Totally Confidant		
10- Seek support from others such as family, friends, groups, and organizations	1	2	3	4	5	6	7	8	9
	Not Confidant at all			Somewhat Confidant			Totally Confidant		
11- Share my fears and concerns with others	1	2	3	4	5	6	7	8	9
	Not Confidant at all			Somewhat Confidant			Totally Confidant		
12. Control nausea and vomiting (whether you have had it before or not)	1	2	3	4	5	6	7	8	9
	Not Confidant at all			Somewhat Confidant			Totally Confidant		
13. Cope with physical difficulties	1	2	3	4	5	6	7	8	9
	Not Confidant at all			Somewhat Confidant			Totally Confidant		
14. Try to maintain calm during waiting for appointment for one hour or more	1	2	3	4	5	6	7	8	9

الرجاء كتابة مايلي:

1- **معلومات عامه**

العمر-------- **الجنس---------** **نوع السرطان----------**

2- **استبيان سلوك مريض السرطان**

يحتوي هذا الاستبيان على امور قد يقوم بها الشحص عندما يتلقى علاج السرطان
نحن مهتمون بتقييمك لمدى ثقتك في امكانية انجازك لهذه الامور.تأكد من ان التقييمات تعكس بدقه مدى ثقتك سواء قمت ام لم تقم بها في السابق
وبالتالي فان هذه التقييمات تعكس مدى ثقتك في امكانية انجازك لهذه الامور حاليا (او في المستقبل القريب
الرجاء قراءة كل عنصر مرقم, ثم قيم هذا العنصر حول مدى ثقتك في امكانية انجاز هذا السلوك. ضع دائره على الرقم الموجود في مقياس التقييم اذا وضعت دائره على رقم1 فانك توضح انك غير واثق تماما من انه يمكنك انجاز هذا التصرف. اذا وضعت دائره على رقم 9 فانك توضح انك واثق تماما من انه يمكنك انجاز هذا التصرف . اما الارقام التي فو وسط مقياس التقييم فتشير الى انك واثق نوعا ما في امكانية قيامك بهذا السوك الرجاء تقييم كافة العناصر . اذا لم تكن متأكدا بشأن عنصر ما فالرجاء اعطاء افضل تقييم ممكن

	غير واثق تماما			واثق نوعا ما			واثق تماما		
1. المحافظة على الاعتماد على النفس	1	2	3	4	5	6	7	8	9
2. المحافظه على الموقف الايجابي	1	2	3	4	5	6	7	8	9
3. المحافظة على روح الدعابة	1	2	3	4	5	6	7	8	9
4. التعبيرعن المشاعرالخاصة بالمرض	1	2	3	4	5	6	7	8	9
5. التحدث عن ما يدوربفكري أحيانا	1	2	3	4	5	6	7	8	9
6. المحافظةعلى الانشطة (العمل,المنزل, الهوايات,الأمور الاجتماعية)	1	2	3	4	5	6	7	8	9
7. محاولة الهدوء اثناء العلاج وعدم السماح للافكار المخيفة ان تقلقني	1	2	3	4	5	6	7	8	9
8. المشاركة بفاعلية في قرارات العلاج	1	2	3	4	5	6	7	8	9
9. طرح اسئلة على الطبيب	1	2	3	4	5	6	7	8	9
10. السعي لطلب المساندة من العائله, الاصدقاء, المجموعات, والمنظمات	1	2	3	4	5	6	7	8	9
11. مشاركة مخاوفي وما يقلقني مع الاخرين	1	2	3	4	5	6	7	8	9
12. التحكم في القيء والغثيان سواء كنت اعاني من هذه المشاكل من قبل ام لا	1	2	3	4	5	6	7	8	9
13. مواجهة الصعوبات البدنية	1	2	3	4	5	6	7	8	9
14. محاولة الهدوء اثناء الانتظار لمدة ساعة واحدة على الاقل في موعد العلاج الخاص بي	1	2	3	4	5	6	7	8	9

Appendix C

The Functional Assessment of Cancer Therapy-Breast and the Arabic version of Functional Assessment of Cancer Therapy-Breast

Below is a list of statements that other people with your illness have said are important**. Please circle one number per line to indicate your response as it applies to the <u>past 7 days</u>.**

	<u>PHYSICAL WELL-BEING</u>	**Not at all**	**A little bit**	**Some -what**	**Quite a bit**	**Very much**
GP1	I have a lack of energy	0	1	2	3	4
GP2	I have nausea	0	1	2	3	4
GP3	Because of my physical condition, I have trouble meeting the needs of my Family	0	1	2	3	4
GP4	I have pain	0	1	2	3	4
GP5	I am bothered by side effects of treatment	0	1	2	3	4
GP6	I feel ill	0	1	2	3	4
GP7	I am forced to spend time in bed	0	1	2	3	4

	<u>SOCIAL/FAMILY WELL-BEING</u>	**Not at all**	**A little bit**	**Some -what**	**Quite a bit**	**Very much**
GS1	I feel close to my friends	0	1	2	3	4
GS2	I get emotional support from my family	0	1	2	3	4
GS3	I get support from my friends	0	1	2	3	4
GS4	My family has accepted my illness	0	1	2	3	4
GS5	I am satisfied with family communication about my illness	0	1	2	3	4
GS6	I feel close to my partner (or the person who is my main support)	0	1	2	3	4
Q1	*Regardless of your current level of sexual activity, please answer the following question. If you prefer not to answer it, please mark this box* ☐ *and go to the next section.*					
GS7	I am satisfied with my sex life	0	1	2	3	4

Please circle one number per line to indicate your response as it applies to the past 7 days.

	EMOTIONAL WELL-BEING	**Not at all**	**A little bit**	**Some-what**	**Quite a bit**	**Very much**
GE1	I feel sad	0	1	2	3	4
GE2	I am satisfied with how I am coping with my illness	0	1	2	3	4
GE3	I am losing hope in the fight against my illness	0	1	2	3	4
GE4	I feel nervous	0	1	2	3	4
GE5	I worry about dying	0	1	2	3	4
GE6	I worry that my condition will get worse	0	1	2	3	4

	FUNCTIONAL WELL-BEING	**Not at all**	**A little bit**	**Some-what**	**Quite a bit**	**Very much**
GF1	I am able to work (include work at home)	0	1	2	3	4
GF2	My work (include work at home) is fulfilling	0	1	2	3	4
GF3	I am able to enjoy life	0	1	2	3	4
GF4	I have accepted my illness	0	1	2	3	4
GF5	I am sleeping well	0	1	2	3	4
GF6	I am enjoying the things I usually do for fun	0	1	2	3	4
GF7	I am content with the quality of my life right now	0	1	2	3	4

Please circle one number per line to indicate your response as it applies to the <u>past 7 days</u>

	ADDITIONAL CONCERNS	Not at all	A little bit	Some-what	Quite a bit	Very much
B1	I have been short of breath	0	1	2	3	4
B2	I am self-conscious about the way I dress	0	1	2	3	4
B3	One or both of my arms are swollen or tender	0	1	2	3	4
Q2	*If you prefer not to answer, please mark this box ☐ and go to the next item.* I feel sexually attractive	0	1	2	3	4
B4						
B5	I am bothered by hair loss	0	1	2	3	4
B6	I worry that other members of my family might someday get the same illness I have	0	1	2	3	4
B7	I worry about the effect of stress on my illness.....	0	1	2	3	4
B8	I am bothered by a change in weight.....	0	1	2	3	4
B9	I am able to feel like a woman	0	1	2	3	4
P2	I have certain parts of my body where I experience pain.....	0	1	2	3	4

هذه قائمة بالعبارات التي ذكر أشخاص بنفس علتك أنها مهمة بالنسبة لهم. **من فضلك ضع دائرة أو علامة على رقم واحد في كل سطر لبيان مدى انطباق إجابتك على حالتك في الأيام السبعة الأخيرة.**

	الكفاءة الجسمانية	**ليس على الإطلاق**	**مرات قليلة**	**نوعاً ما**	**غالبا**	**كثيرا جدا**
GP1	أشعر بالوهن.....	0	1	2	3	4
GP2	أشعر بالغثيان (أحساس بالقئ).....	0	1	2	3	4
GP3	بسبب حالتي الصحية – لدي صعوبة في تلبية احتياجات أسرتي.....	0	1	2	3	4
GP4	أشعر بألم.....	0	1	2	3	4
GP5	أشعر بالضيق من الآثار الجانبية للعلاج	0	1	2	3	4
GP6	أشعر أنني عليل (مريض)	0	1	2	3	4
GP7	أنا مضطر لملازمة الفراش.....	0	1	2	3	4
	الكفاءة الاجتماعية و الأسرية	**ليس على الإطلاق**	**مرات قليلة**	**نوعاً ما**	**غالبا**	**كثيرا جدا**
GS1	أشعر أنني قريب من أصدقائي.....	0	1	2	3	4
GS2	أحظى بتعاطف أسرتي.....	0	1	2	3	4
GS3	أجد كل الدعم من أصدقائي.....	0	1	2	3	4
GS4	لقد تقبلت أسرتي حالتي الصحية.....	0	1	2	3	4
GS5	أنا راض عن الكيفية التي تتعامل بها أسرتي مع مرضي	0	1	2	3	4
GS6	أشعر بالقرب من زوجي / زوجتي (أو الشخص الذي يمثل لي الدعم الرئيسي).....	0	1	2	3	4
Q1	**بغض النظر عن حالتك الجنسية حاليا، من فضلك أجب عن هذا السؤال. إذا كنت لا ترغب في الإجابة من فضلك ضع علامة في هذا المربع ☐ ثم انتقل إلى السؤال التالي:**					
GS7	أنا راض عن حياتي الجنسية.....	0	1	2	3	4

من فضلك ضع دائرة أو علامة على رقم واحد في كل سطر لبيان مدى انطباق إجابتك على حالتك في الأيام السبعة الأخيرة.

	الكفاءة العاطفـــــية	**ليس على الإطلاق**	**مرات قليلة**	**نوعاً ما**	**غالبا**	**كثيرا جدا**
GE1	أشعر بالحزن	0	1	2	3	4
GE2	أنا راض عن تقبلي لحالتي الصحية	0	1	2	3	4
GE3	أفتقد الأمل في مقاومتي لمرضي.....	0	1	2	3	4
GE4	أشعر بالعصبية.....	0	1	2	3	4
GE5	أنا قلق من الموت.....	0	1	2	3	4
GE6	أخاف أن تسوء حالتي.....	0	1	2	3	4

	الكفاءة الوظيفيـــــة	**ليس على الإطلاق**	**مرات قليلة**	**نوعاً ما**	**غالبا**	**كثيرا جدا**
GF1	أنا قادر على العمل (بما في ذلك العمل في المنزل)	0	1	2	3	4
GF2	عملي (بما في ذلك عملي في المنزل) يرضيني.....	0	1	2	3	4
GF3	أنا قادر على الاستمتاع بالحياة	0	1	2	3	4
GF4	لقد تقبلت مرضي	0	1	2	3	4
GF5	أنام جيدا	0	1	2	3	4
GF6	أستمتع بالأشياء التي أقوم بها للترفيه.....	0	1	2	3	4
GF7	أنا راض عن طبيعة حياتي الآن	0	1	2	3	4

من فضلك ضع دائرة أو علامة على رقم واحد في كل سطر لبيان مدى انطباق إجابتك على حالتك في الأيام السبعة الأخيرة.

	اهتمامات إضافية	ليس على الإطلاق	مرات قليلة	نوعاً ما	غالبا	كثيرا جدا
B1	أعاني من نوبات ضيق تنفس	0	1	2	3	4
B2	أشعر بحرج بسبب ملابسي	0	1	2	3	4
B3	أحد ذراعيّ أو كلاهما متورم أو حساس للغاية	0	1	2	3	4
	إذا كنت لا ترغب في الإجابة من فضلك ضع علامة في هذا المربع ☐ ثم انتقل إلى السؤال التالي:					
B4	أشعر أنني جذاب/جذابة جنسياً.....	0	1	2	3	4
B5	يضايقني سقوط شعري	0	1	2	3	4
B6	أشعر بالقلق من احتمال أن يصاب أفراد آخرون من أسرتي يوماً ما بنفس المرض الذي لدي	0	1	2	3	4
B7	أشعر بالقلق من تأثير التوتر على مرضي .	0	1	2	3	4
B8	يزعجني التغير في الوزن.....	0	1	2	3	4
B9	أنا قادرة على الشعور بأني امرأة	0	1	2	3	4
P2	هناك أجزاء معينة من جسمي أشعر فيها بألم	0	1	2	3	4

Appendix D

Data Collection Protocol

Data collection protocol

1) Assemble Supplies

- Cancer Behavior Inventory-Brief Arabic (CBI-BA)
- Functional Assessment of Cancer Therapy-Breast Arabic (FACT-BA)
- Informed consent document (IFC) in Arabic
- Pencils (2)
- Pencil sharpener
- 4 envelopes (IFC, CBI-BA, FACT-BA, and Completed)
- Clipboard
- Notebook
- Eraser
- Pen
- Stapler

2) Instrument Testing Steps

1. Go to outpatient clinic in oncology center.
2. Meet the oncologists responsible for cancer cases.
3. Introduce self.
4. Explain the purpose of the study to the oncologist: "I am testing Arabic versions of the Cancer Behavior Inventory – Brief and the Functional Assessment of Cancer Therapy – Breast. My population is patients with cancer, and I'm particularly interested in studying women with breast cancer."
5. Ask the oncologist to inform patients of the study.
6. Meet the patient and introduce self.
7. Give volunteer the IFC to read, then review the content with the volunteer and explain the purpose of the study to the participant (in Arabic).
8. After consent to participate is obtained, say: "Thank you for your willingness to take part in this study. All of the information you will provide will be confidential and will be used only for research purposes. I translated a questionnaire that is

used to measure self-efficacy for coping with cancer. Your responses will help us understand how you cope with cancer. I will be sitting beside you. If you have difficulty understanding any question, you can ask me." For women with breast cancer, I will add "You are asked to fill out a second questionnaire about quality of life in women with breast cancer." For those selected for cognitive interviewing, I will add "We would like to know what you thought about the questions on the CBI-BA. Are you willing to review each question and your response with me?"

9. Open the envelope that contains the CBI-BA for all participants and FACT-BA for participants with breast cancer, attach the instrument(s) to the clipboard, and give to participant with pencil.
10. Say, "Please answer each question and let me know when you are done."
11. Ask the participant if he/she has any questions.
12. For the 30 participants selected for cognitive interviewing, go through each item of the CBI-BA and ask the participant to respond to the following questions:
    a. What did this question mean to you?
    b. Why did you select this answer?
    c. Can I rephrase this question to make it easier to understand? If so, how?
13. Thank the participant.
14. Staple instruments from the same participant together.
15. Place the instrument(s) in the "completed" envelope.

16. Write the participant's comments and recommendations in the notebook with the pen.
17. Enter responses to the instruments into SPSS database.
18. Compute Cronbach's alpha for the CBI-BA (all participants and women with breast cancer separately).
19. Address reversed scores and missing values based on guidelines for scoring the FACT-B available at www.facit.org
20. Compute Cronbach's alpha for the FACT-BA.
21. Conduct exploratory factor analysis with principal axis factoring for the CBI-BA (all participants and women with breast cancer separately).
22. Conduct exploratory factor analysis with principal axis factoring for the FACT-BA.
23. Collate participant comments from the cognitive interviews by item.

Appendix E

Data Collection Form for Cognitive Interviews

Data Collection Form for Cognitive Interviews

	Item	Number of correct explanations	Number of wrong explanations	Recommended paraphrasing and comments
1.	**Maintain self-reliance**			
2.	**Maintain a positive attitude**			
3.	**Maintain a sense of humor**			
4.	**Express feelings about the disease**			
5.	**Talk about things on my mind at times**			
6.	**Maintain activities (work, home, hobbies, social)**			
7.	**Try to be calm throughout treatments and not allow scary thoughts to upset me**			
8.	**Actively participate in treatment decisions**			
9.	**Ask physician questions**			
10	**Seek support from others such as family, friends, groups, and organizations**			
11	**Share my worries or concerns with others**			
12	**Manage nausea and vomiting (whether or not I have had these problems in the past)**			
13	**Cope with physical difficulties**			
14	**Try to be calm while waiting one hour or more for my appointment**			

Appendix F

Consent Form

Consent Form to Participate in Research

Psychometric Performance of Arabic Versions of the Cancer Behavior Inventory- Brief and Functional Assessment of Cancer Therapy-Breast

HSC-SN-14-0265

Part 1: English version Dialog for consent discussion. This will be read to participants and they will be allowed adequate time for questions regarding the study.

Part 2: Arabic version contains equivalent information as included in Part 1 of this document. This section is the Letter of Notification and will be attached as a cover letter to the questionnaires. The intent is to supply the participants with both an oral and a written version of the consent information. The participants will remove and retain the Letter of Notification at the time of the consent discussion. By reading the Letter and completing the questionnaires, the participants will be giving verbal consent.

INVITATION TO TAKE PART

You are invited to take part in the study "Psychometric performance of Arabic versions of the Cancer Behavior Inventory-Brief and Functional Assessment of Cancer Therapy-Breast Cancer." The study is also known by the shorter name "CBI-BA and FACT-BA Psychometrics." Maaidah Algamdi MSN, RN, a PhD student at the University of Texas Health Science Center at Houston (UTHSC-H), is the study's principal investigator. The study is being supervised by Sandra K. Hanneman, PhD, RN, FAAN, and Diane W. Wardell, PhD, RN, who are the faculty advisors. This research project has been reviewed by the Committee for Protection of Human Subjects (CPHS) of UTHSC-H as HSC-SN-14-0265.

Your decision to take part is your choice. You may refuse to take part or choose to stop from taking part for any reason at any time. You may refuse to answer any question asked or written on any forms.

PURPOSE

The purpose of this study is to assess how well two questionnaires work. In other words, do they provide reliable responses and elicit the information they are intended to measure? The Arabic translations of the Cancer Behavior Inventory-Brief and the Functional Assessment of Cancer Therapy-Breast Cancer are the two questionnaires. Approximately 370 Arabic-speaking adults, 18 – 75 years old, diagnosed with cancer, and able to read and write will take part in this study.

PROCEDURES

If you decide to take part in this study, you will be asked to fill out one or two (if your diagnosis is breast cancer) questionnaire(s). The first questionnaire has 14 items and asks about how well you think you are coping with cancer; every participant will be asked to fill out this questionnaire. If you have been diagnosed with breast cancer, you will be asked to fill out the second questionnaire, which has 37 items and asks about your quality of life. Also, 30 of the 370 participants will be picked by chance (like a coin toss) and asked to review the coping questionnaire questions with the principal investigator to help evaluate how well the Arabic version of the coping with cancer questionnaire has been translated from English to Arabic.

TIME COMMITMENT:

Filling out the coping with cancer questionnaire will take less than 5 minutes of your time. Filling out the quality of life questionnaire will take less than 10 minutes of your time. If you are chosen for the questionnaire review with the principal investigator, that will take about 15 minutes.

KNOWN RISKS AND/OR DISCOMFORTS

There are no risks or discomforts associated with this study.

BENEFITS

There is no benefit to you from taking part in this study. The information we learn may benefit the care of future Arabic-speaking patients with cancer.

ALTERNATIVES The alternative is not to take part in the study.

STUDY WITHDRAWAL

Your taking part in this study is voluntary. You may decide not to take part. If you do take part, you may drop out of the study at any time. Not taking part or dropping out of this study will involve no penalty and will not affect your health care.

COSTS, REIMBURSMENT AND COMPENSATION

There is no cost and you will not be paid to take part in this study.

IN CASE OF INJURY

If you suffer any injury as a result of taking part in this research study, please understand that nothing has been arranged to provide free treatment of the injury or any other type of payment. However, all needed facilities, emergency treatment and professional services will be available to you, just as they are to the community in general. Please report any injury to Maaidah Algamdi at 0560091866 and to the Committee for the Protection of Human Subjects at +1 (713) 500-7943. You will not give up any of your legal rights by signing this consent form.

CONFIDENTIALITY

Only your age, gender, and type of cancer will be collected. Your name or other personal information will not be requested.

QUESTIONS

Please be sure that all of your questions about the study have been answered. If you have questions at any time about this research study, please contact the Principal Investigator, Maaidah Algamdi, at 0560091866.

CPHS STATEMENT

This study (HSC-SN-14-0265) has been reviewed by the Committee for the Protection of Human Subjects (CPHS) of the University of Texas Health Science Center at Houston.

If you have questions about your rights as a research participant in this study, call the CPHS Office at +1(713)-500-7943. You will receive this consent form if you participate in the study. For any questions about research subjects' rights, or to report a research-related injury, call the CPHS at +1 (713) 500-7943.

الأداء السيكومتري للإصدارات العربية في نشرة المختصره لجرد سلوك السرطان والتقييم الوظيفي لعلاج السرطان-سرطان الثدي

HSC- SN- 14 -0265

دعوة للمشاركة

أنت مدعو للمشاركة في دراسة قياس الأداء السيكومتري من الإصدارات العربية للنشرة المختصره لجرد سلوك السرطان والتقييم الوظيفي لعلاج السرطان –سرطان الثدي

وهي معروفه بالاسم الأقصر(الاداء السيكومتري ل FACT -BA و CBI -BA)

الباحث الرئيسيي لهذه الدراسه :معيضة الغامدي, طالبة دكتوراة في جامعة تكساس للعلوم الصحية في هيوستن, ماجستير في التمريض وممرضه قانونية. ويتم الاشراف عليها من قبل د. ساندرا هانيمان , دكتوراه في التمريض وممرضه قانونيه(جامعة تكساس للعلوم الصحية في هيوستن) والدكتوره ديان واردال , دكتوراه في التمريض وممرضه قانونيه(جامعة تكساس للعلوم الصحية في هيوستن) وهمااستشاريتان وأعضاء هيئة التدريس .وقد روجع هذا المشروع البحثي من قبل لجنة حماية الإنسان

قراركم للمشاركة هو اختياركم . بامكانكم رفض المشاركه او التوقف لأي سبب و في أي وقت. وبامكانكم رفض الإجابة عن أي سؤال موجه لكم في أي شكل سواء شفهيا اوكتابيا لغرض من هذه الدراسة هو تقييم مدى نجاح العمل على استبيانان. وبعبارة أخرى ،هل توفر اجابات الاستبيانات معلومات موثوق بها تهدف الى قياس ما يجب قياسه؟ الترجمات العربية لجرد سلوك مريض السرطان و التقييم الوظيفي لعلاج سرطان الثدي ، وللمشاركه في هذه الدراسة نتطلب الى ما يقارب 481 من البالغين الناطقين باللغة العربية ،بعمر 18 - 75 سنة ، قدتم تشخيصهم بالسرطان ، وقادرين على القراءة والكتابة.

إذا قررت المشاركة في هذه الدراسة ، سوف يطلب منك ملء استبيان او اثنان (إذا كان التشخيص هو سرطان الثدي). الاستبيان الأول له 14 عنصرا و يسأل عن كيفة تعاملك مع السرطان ، وسيتم طلب كل مشارك ملء هذا الاستبيان . إذا كنت قد تم تشخيصك بسرطان الثدي، سوف يطلب منك ملء الاستبيان الثاني ، والذي لديه 37 عنصرا و يسأل عن نوعية الحياة الخاصة بك . اضافه الى ذلك ، سيتم اختيار 30 من اصل 481 من المشاركين عشوائيا ويطلب منهم مراجعة اسئلة "استبيان التعامل مع السرطان" مع الباحث الرئيسي وذلك للمساعدة في تقييم مدى توافق ترجمة النسخة العربية من التعامل مع النسخه الانجليزية.

يستغرق ملء استبيان التعامل مع السرطان أقل من 10 دقائق من وقتك. و ملء استبيان نوعية الحياة تستغرق أقل من 15دقيقة من وقتك. إذا كنت يتم اختيار لاستعراض الاستبيان مع الباحث الرئيسي ، من شأنها أن تأخذ حوالي 15 دقيقة.

لا يوجد مخاطر أو مضايقات مرتبطة بهذه الدراسة ليس هناك فائدة لكم من المشاركة في هذه الدراسة لكن المعلومات التي سنحصل عليها قد تفيد في رعاية مرضى السرطان الناطقين بالعربية في المستقبل المشاركه في هذه الدراسة هو تطوعي و قد تقررعدم المشاركة . بامكانك الانسحاب من الدراسة في أي وقت حيث لا تترتب اي عقوبه من عدم المشاركه او الانسحاب من الدراسه ولن تتأثر الرعاية الصحية الخاصة بك بأي حال من الاحوال.

إذا كنت تعاني من أي إصابات نتيجة مشاركتك في هذه الدراسة البحثية ، عليك أن تعلم أنه لم يتم ترتيب أي شيء لتوفير العلاج المجاني للإصابة أوأي نوع آخر من الدفع. ومع ذلك ، فإن جميع التسهيلات اللازمة والعلاج في حالات الطوارئ ستكون متاحة لك ، تماما كما هي بالنسبة للمجتمع بشكل عام.

في حالة الاصابه يرجى ابلاغ معيضة الغامدي على 0560091866

وابلاغ لجنة حماية الانسان وسوف لن تتخلى عن أي من حقوقك القانونية من خلال التوقيع هذا النموذج.

وسيتم جمع العمر والجنس ، و نوع السرطان فقط و لن يطلب اسمك أو معلومات شخصية أخرى.

يرجى التأكد من أن جميع أسئلتك حول الدراسة قد تم الرد عليها.

بيان CPHS

هذه الدراسه (HSC- SN- 14 -0265) قد روجعت من قبل لجنة حماية الانسان في مركز العلوم الصحية في جامعة تكساس بهيوستن إذا كان لديك أسئلة حول حقوقك كمشارك البحث في هذه الدراسة ، الاتصال بمكتب(CPHS) على 1713943500+ وسوف تحصل على نسخه من نموذج الموافقه في حالة مشاركتك في الدراسة. للاجابةعلى اي اسئله بخصوص حقوقكم كمشاركين في الدراسه اوفي حالة الاصابه الناجمه عن المشاركه يرجى الاتصال بمكتب (CPHS) على 1713943500+

Appendix G

Institutional Review Board Approvals

UTHealth
The University of Texas
Health Science Center at Houston

Committee for the Protection of Human Subjects
6410 Fannin Street, Suite 1100
Houston, Texas 77030

Maaidah Algamdi
UT-H - SN - Nursing Systems

April 30, 2014

HSC-SN-14-0265 - *Psychometric Properties of Arabic Versions of Cancer Behavior Inventory- Brief and Functional Assessment of Cancer Therapy-Breast Cancer*

The above named project is determined to qualify for exempt status according to 45 CFR 46.101(b)

***CATEGORY #2**: Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless:*

a. information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; AND ,

b. any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

(NOTE: The exemption under Category 2 DOES NOT APPLY to research involving survey or interview procedures or observation of public behavior when individuals under the age of 18 are subjects of the activity except for research involving observations of public behavior when the investigator(s) do not participate in the activities being observed.)

Health Insurance Portability and Accountability Act:
Exempt from HIPAA

CHANGES: Should you choose to make any changes to the protocol that would involve the inclusion of human subjects or identified data from humans, please submit the change via iRIS to the Committee for the Protection of Human Subjects for review.

STUDY CLOSURES: Upon completion of your project, submission of a study closure report is required. The study closure report should be submitted once all data has been collected and analyzed.

Should you have any questions, please contact the Office of Research Support Committees at 713-500-7943.

Kingdom of Saudi Arabia
Ministry of Health
King Fahad Medical City
(162)

وزارة الصحة
مدينه الملك فهد الطبية
King Fahad Medical City

المملكة العربية السعودية
وزارة الصحة
مدينه الملك فهد الطبية
(١٦٢)

IRB Registration Number with KACST, KSA: H-01-R-012
IRB Registration Number with OHRP/NIH, USA: IRB00008644
Approval Number Federal Wide Assurance NIH, USA: FWA00018774

December 18, 2014
IRB Log Number: 14-342E
Department: External
Category of Approval: EXEMPT

Dear Maaidah Mouid Algamdi:

I am pleased to inform you that your submission dated December 17, 2014 for the study titled '**Psychometric Properties of Arabic Version of Brief-Cancer Behavior Inventory (CBI-BA) and Arabic Version of Functional Assessment of Cancer Therapy-Breast Cancer (FACT-BA)**' was reviewed and was approved. Please note that this approval is from the research ethics perspective only. You will still need to get permission from the head of department or unit in the hospital where you want to research in order to commence data collection.

We wish you well as you proceed with the study and request you to keep the IRB informed of the progress on a regular basis, using the IRB log number shown above.

If you have any further questions feel free to contact me.

Sincerely yours,

Prof. Omar H. Kasule
Chairman Institutional Review Board--IRB.
King Fahd Medical City, Riyadh, KSA.
Tel: + 966 1 288 9999 Ext. 17540
E-mail: okasule@kfmc.med.sa

PRINCE SULTAN MILITARY MEDICAL CITY

P.O. Box 7897, Riyadh 11159
Kingdom of Saudi Arabia

RESEARCH CENTER

Research Ethics Committee
(Reg. # HAP-01-R-015)

10 March 2015

MS. MAAIDAH M. ALGAMDI
PhD Student
University of Texas Health Science Center
Houston, Texas

Re: Psychometric performance of Arabic versions of the cancer behavior inventory-brief and the functional assessment of cancer therapy-breast cancer

Please be informed that the above mentioned proposal has been reviewed and discussed by a subcommittee appointed by Research Ethics Committee. After receiving their affirmative reports, the committee is pleased to approve this study.

Your research protocol has been documented under:

Project No.	667
Date Approved	09 March
Series of	2015

Kindly quote the project number indicated herein in all transactions and communications. You are advised to submit a report in relation to this research scheme to update the committee of its progress.

I trust your research scheme proves fruitful and beneficial to the PSMMC.

Best regards,

DR. SAEED KADASAH
Chairman, Research Ethics Committee
First Floor, Building 15

Editor [Ian Norman, PhD, RN, BABCP, FRNC, FEANS, FAAN]

Dear Dr. Norman,

I am submitting a manuscript entitled "Psychometric Performance of the Arabic Versions of the Cancer Behavior Inventory-Brief and the Functional Assessment of Cancer Therapy-Breast in Saudi Arabia" for consideration of publication in the *International Journal of Nursing Studies.* The manuscript presents the results of reliability and validity testing of the Arabic versions of Cancer Behavior Inventory – Brief and the Functional Assessment of Cancer Therapy-Breast in Saudi Arabia, and addresses cultural issues that might influence construct validity of both instruments. The manuscript has been submitted only to the *International Journal of Nursing Studies*. We think that it is a good fit because of the international focus of the journal. Please advise if you need further information to consider our manuscript.

Sincerely,

Maaidah M. Algamdi
PhD Student
University of Texas Health Science Center at Houston School of Nursing

Cc: Sandra K. Hanneman, PhD, RN, FAAN, Major Professor

Psychometric Performance of the Arabic Versions of the Cancer Behavior Inventory-Brief and the Functional Assessment of Cancer Therapy-Breast in Saudi Arabia

Maaidah M. Algamdi, MSN, RN

PhD Student

University of Texas Health Science Center at Houston School of Nursing

Email: Maaidah.Algamdi@uth.tmc.edu

Send correspondence to:

Maaidah M. Algamdi, MSN, RN

PhD student, School of Nursing

Center for Nursing Research, Room 585

University of Texas Health Science Center at Houston

6901 Bertner Avenue

Houston, Texas 77030

Phone: (713) 500-2030; Fax: (713) 500-0266

Abstract

Purpose: To test psychometric performance of the Cancer Behavior Inventory - Brief Arabic (CBI-BA), including semantic equivalence of the CBI-BA with the original English version (CBI-B), and the Functional Assessment of Cancer Therapy- Breast Arabic (FACT-BA).

Methods: Using a cross-sectional design, 438 patients with a cancer diagnosis in Riyadh, Saudi Arabia completed the CBI-BA, 30 of whom completed cognitive interviews about the CBI-BA. A subsample 167 women with breast cancer also completed the FACT-BA. Internal consistency evidence was assessed with Cronbach's alpha (α) and construct validity with principal axis factoring.

Findings: Internal consistency estimates were acceptable for the CBI-BA (α = .79 -.80) and the total FACT-BA (α = .88) scales, but variable for the FACT-BA subscales (α= .63 - .89). Exploratory factor analyses showed evidence of construct validity for the CBI-BA; one factor was derived, compared with four in the CBI-B. Cognitive interviews indicated satisfactory semantic equivalence of the CBI-BA with the CBI-B. The Breast Cancer subscale of the FACT-BA had inadequate α and a low response rate, which precluded testing construct validity. The Arabic version of the general FACT-G scale (FACT-GA) had four factors, according to expectation, in Arabic women with breast cancer.

Conclusions: The CBI-BA has adequate psychometric performance to measure self-efficacy for coping with cancer in Arabic patients. The FACT-GA, but not the FACT-BA, has adequate evidence of reliability and validity to measure quality of life in Arabic women with breast cancer.

Clinical Relevance: The availability of culturally sensitive and psychometrically sound instruments for the Arabic population diagnosed with cancer should be valuable for health care clinicians and researchers.

Keywords: cancer patients, Cancer Behavior Inventory-Brief, cognitive interview, Functional Assessment of Cancer Therapy, quality of life, reliability, self-efficacy for coping, validity, women with breast cancer

Introduction

A substantial health problem around the world, cancer is the second leading cause of death in the United States and the fourth in Saudi Arabia (Siegel, Miller & Jemal, 2015; World Health Organization, 2014). Cancer is a condition that requires coping with a new life that includes changes in health behaviors (Hoffman, Lent & Raque-Bogdan, 2013). Individuals' internal beliefs about their health-related activities guide them to execute certain behaviors or change particular habits to maintain their health. Bandura (1977) posited that the nature of humans involves interactions among the individual's beliefs, behaviors, environment, and cognition. These interactions direct subsequent changes in human behavior. Bandura (1993) defined self-efficacy as a person's beliefs in his or her capabilities to control level of function within the surroundings that influence the person's life. Lev (1997) used Bandura's Theory of Self-efficacy to illustrate the role of self-efficacy for coping (SEC) with cancer in behavioral adaptation. Barlow (2010) suggested that self-efficacy enhances health status outcomes. SEC is an important attitude to assess in patients with cancer so that interventions may be designed to increase low levels or maintain high levels of SEC with cancer. Assessment of SEC in Arabic populations requires the availability of psychometrically sound instruments.

Bandura's (2002) description of how the complexity of culture shapes human behavior led to the importance of considering Arabic culture in testing SEC with cancer, which can be measured with the Cancer Behavior Inventory-Brief (CBI-B), based on the Theory of Self-efficacy. Verbatim translation of an instrument is insufficient for ensuring the intended meaning of the instrument's items. Reeve et al. (2011) suggested that cognitive interviewing provides an in-depth method of detecting cognitive issues with the

phrasing of items in a translated instrument. Validity depends on the translated instrument being semantically equivalent to the original one. Cognitive interviewing helps ensure that the translation is both culturally appropriate and captures the concept(s) intended for measurement with the original instrument (Beck, Bernal, & Froman, 2003).

Lev et al. (2001) observed a significant improvement in the quality of life (QOL) of women with breast cancer after enhancing self-efficacy with an intervention. Women with high SEC with breast cancer tend to engage in positive behaviors that reflect high QOL (Heitzmann et al., 2011). Heitzmann and colleagues conceptualized QOL as physical, emotional, family/social, and functional well-being, consistent with others' conceptualization of QOL as a multidimensional construct (Bader & Kerbs, 2012; Chen, Weiss, Heyman, Cooper, & Lusting, 2010). Chen et al. added a disease component to the definition of QOL (perceived health and disease), indicating that the disease itself could be considered an essential aspect. Others have promulgated that QOL also can be determined by socio-demographic characteristics, disease, and treatment outcomes (Yang, Brother, & Anderson, 2008).

Women with breast cancer face several issues throughout the course of diagnosis, treatment, and recovery (DiSipio, Hayes, Newman, & Janda, 2009; Watson, Homewood, & Haviland, 2012) that can negatively affect QOL and survival (Watson, et al.). Some women with breast cancer experience poor QOL due to an inability to cope with their illness (Akin, Can, Durna, & Aydiner, 2008). Arabic women with breast cancer face additional issues associated with stigma, fear, and anxiety that influence the woman's abilities to cope with breast cancer (Alam, 2006; Al-Zaben, Sehlo, & Koenig, 2015;Amin, Almulhim & Almeqihwi, 2009; Donnelly et al., 2013; Sarhan, 2009), and

consequently affect QOL. The Functional Assessment of Cancer Therapy-Breast (FACT-B), a measure of QOL for women with breast cancer (Brady et al., 1997), has been translated into Arabic (available at: http://www.facit.org/FACITOrg/Questionnaires).

The Cancer Behavior Inventory-Brief Arabic (CBI-BA) was recently developed to measure SEC with cancer in the Arabic-speaking population (Algamdi & Hanneman, in press-a). Preliminary evidence for internal consistency reliability of the CBI-BA was tested with 97 Arabic-speaking patients with cancer in Houston, Texas, USA; Cronbach's alphas were ≥ .76 (Algamdi & Hanneman, in press-b), indicating adequate reliability estimates for a new instrument (Nunnally & Bernstein, 1994). No evidence of reliability was located for the FACT-BA, so internal consistency of the FACT-BA scale and subscales in Arabic-speaking women with breast cancer in Houston was tested. Cronbach's alpha for the total scale was .91, but subscale alphas varied from .43 - .89 (Algamdi & Hanneman, in press-b).

Study Aims

The purpose of the present study was to test the psychometric performance of the CBI-BA and the FACT-BA in the Arabic-speaking population in Saudi Arabia. Randomly selected participants also participated in cognitive interviews to determine the semantic equivalence of the CBI-BA with the CBI-B. The study aims were to evaluate in Arabic outpatients with cancer evidence for: (1) internal consistency reliability of the CBI-BA using Cronbach's alpha (α), (2) validity of the CBI-BA using exploratory factor analysis (EFA) and cognitive interviewing; (3) internal consistency reliability of the FACT-BA using α; and (4) validity of the FACT-BA using EFA. Aims 3 and 4 were tested only with women with breast cancer.

Methodology

Design, Sample, and Setting

The study was approved as exempt from review by the University of Texas Health Science Center at Houston Committee for the Protection of Human Subjects and by King Fahad Medical City and Prince Sultan Medical Military City oncology centers. Using a cross-sectional design, 443 adults with a diagnosis of cancer were recruited from two oncology centers located in Riyadh, Saudi Arabia. Oncologists at the two centers were asked to notify patients of the study at the patient's regular appointment time, and a snowball sampling technique (Polit & Beck, 2012) was used to generate the convenience sample. After providing informed consent, all participants were asked to complete the CBI-BA; of these, 30 participants were randomly selected to participate in cognitive interviews about the CBI-BA. From the pool of all participants, those diagnosed with breast cancer were asked to also complete the FACT-BA.

Instruments

The CBI-BA is a 14-item, self-report, norm-referenced, paper-and-pencil instrument that takes ≤ 5 minutes to complete. This instrument was developed to measure SEC with cancer in the Arabic-speaking population (Algamdi & Hanneman, in press-a), and is a translation of the 14-item CBI-B posted for public use (http://psychooncologynd.com/).

The CBI-B is the result of a sequence of versions that started with 43 items and ended with 12 items. Originally, Merluzzi, and Martinez Sanchez (1997) developed the Cancer Behavior Inventory (CBI) with 43 items (version 1.0). Factor analysis with a

sample of 502 patients with cancer produced six factors: (1) maintaining activity and independence, (2) coping with treatment-related side effects, (3) accepting cancer/maintaining positive attitude, (4) seeking and understanding medical information, (5) affective regulation, and (6) seeking support. Merluzzi et al. (2001) reduced the items of this long scale to 33 and added a stress management subscale (version 2.0), which was tested with 280 cancer patients. Factor analysis yielded seven factors: (1) maintaining activity and independence, (2) seeking and understanding medical information, (3) managing stress, (4) coping with treatment-related side-effects, (5) accepting cancer/maintaining positive attitude, (6) affective regulation, and (7) seeking support. Heitzmann et al. (2011) developed a brief version of the CBI (CBI-B) and conducted multiple exploratory and confirmatory factor analyses with data from three samples of 735, 199, and 370 patients with cancer. The results varied, but the optimal solution had 12 items loaded on 4 factors: (1) maintaining independence and positive attitude, (2) participating in medical care, (3) coping and stress management, and (4) managing affect. Although confirmatory factor analyses conducted by Heitzmann and colleagues showed optimal statistical fit indices for a 12-item CBI-B, the 14-item CBI-B in the public domain was translated into Arabic, assuming that the extra two items might serve the construct validity of the Arabic version and psychometric testing could be done with both the 14- and 12-item brief versions.

The CBI-BA uses a 9-point, Likert-type scale (1 = not at all confident, 9 = totally confident). The sum of the item scores indicates the level of SEC, with higher scores reflecting a stronger SEC than lower scores (Heitzmann et al., 2011). Demographic data

of age, gender, and type of cancer diagnosis were added to the CBI-BA for a description of the sample.

The FACT-BA is a 37-item, self-report, norm-referenced, paper-and-pencil instrument developed to measure QOL of Arabic women with breast cancer over the past 7 days; it takes about 10 minutes to complete. The original FACT-B (Brady et al., 1997) consists of the Functional Assessment of Cancer Therapy-General (FACT-G) scale, with four subscales, and an additional breast cancer subscale, labeled "Additional Concerns," that was added to serve special concerns of the breast cancer population. The subscales are Physical Well-being (PWB), Social Well-being (SWB), Emotional Well-being (EWB), Functional Well-being (FWB), and Additional Concerns (Breast Cancer subscale). The FACT-BA uses a 5-point Likert-type scale, scored from 0 (not at all) to 4 (very much). After reverse-scoring 20 items, the item scores are summed. Higher total FACT-BA scores indicate better quality of life than lower scores.

Data Collection

Data were collected between March and July 2015. Before data collection commenced, 30 numbers were generated randomly by computer. Participants with study identification codes that matched the randomly generated numbers were invited to participate in cognitive interviews, after completing the CBI-BA, to determine semantic equivalence of the CBI-BA items. The participants selected for cognitive interviewing were asked the following questions about each item on the CBI-BA: (a) What did this question mean to you? (b) Why did you select this answer? (c) Can I rephrase this question to make it easier to understand? If so, how? The participants' responses were recorded manually. Women with breast cancer who completed the CBI-BA were asked to

complete also the FACT-BA, regardless of whether or not they had participated in cognitive interview. Administration of the instrument(s) and cognitive interviews were conducted in Arabic in a private area of the oncology center by the author.

Data Management and Analysis

Responses to the instruments were entered into an Excel database and imported into SPSS statistical software (version 23, IBM Corp. Armonk, NY). Data analysis included descriptive statistics, Cronbach's alpha for internal consistency reliability, and EFA with Principal Axis Factoring (PAF) and both orthogonal (Varimax) and oblique (Promax) rotations for construct validity. The distribution of data was assessed using histogram and the Kolmogorov-Smirnov normality test. Missing values were handled using the imputation method (Donders, van der Heijden, Stijnen, & Moons, 2006). When inter-item correlation was ≥ .3, the missing value was replaced by the average score of the participant's responses for all other items. If inter-item correlation was < .3, imputation was not used and the item was treated as a missing value.

Cronbach's alpha for the CBI-BA was computed for all participants with cancer and, separately, for women with breast cancer; Cronbach's alpha for the FACT-BA was computed for women with breast cancer. The criterion for adequate evidence of internal consistency was Cronbach's $\alpha \geq .70$ (Nunnally & Bernstein, 1994).

Separate EFAs were conducted for the CBI-BA for all participants with cancer and for women with breast cancer, and for the FACT-BA for women with breast cancer. The scree plot, testing eigenvalue departure from linearity (Williams, Brown, & Onsman, 2012), was used to determine the number of factors extracted. A priori criteria for an acceptable solution included factor loadings ≥ .30, cross-loadings > .20, and ≥ 3 items per

factor (Leech, Barrett & Morgan, 2011; DeVellis, 2012). Based on the hypothesized subscales and the a priori criteria, a 3-factor solution for the CBI-BA and a 5-factor solution for the FACT-BA were expected. A 3-factor, in contrast to 4-factor, solution was expected for the CBI-BA because only two items loaded on Factor 2 (participating in medical care) in the Heitzmann et al. (2011) optimal solution.

Participants' comments from the cognitive interviews were collated and described by CBI-BA item. The criterion for future revision was more than nine constructive comments per item; nine or more comments indicated that ≥ 30% of participants had difficulty with the item. Fewer than nine constructive comments, with an acceptable explanation of the response choice, indicated acceptable semantic equivalence of the CBI-BA item with the CBI-B.

Results

Of the 443 participants recruited, 438 (98.8%) completed the CBI-BA. Of the 438 who completed the CBI-BA, 168 were women with breast cancer, 167 (99.4%) of whom completed the FACT-BA. Thirty participants completed the cognitive interview. Sociodemographic characteristics of the sample are presented in Table 1.

The internal consistency estimates for the CBI-BA (patients with cancer and women with breast cancer) and the FACT-BA (women with breast cancer) are reported in Table 2. The mean inter-item correlation was .23 for the CBI-BA and .18 for the FACT-BA. Total scores of the CBI-BA were negatively skewed; median (and interquartile range) was 95 (82), with minimum and maximum values of 44 and 126, respectively. Total scores for the FACT-BA were normally distributed; mean (±SD) was 99.7 (± 21), with minimum and maximum values of 33 and 140, respectively. Out of 167 women with breast cancer, 111 women did not respond to item 4 in the breast cancer subscale; the

inter-item correlation was .14, which was lower than the .3 a priori criterion for missing value imputation.

For the CBI-BA EFA in cancer patients, the subject-to-item ratio was 31:1. The Kaiser-Meyer-Olkin (KMO) test was .848, indicating adequacy of the sample to conduct factor analysis, and the Bartlett test ($p < .001$) indicated that the correlation matrix and identity matrix were significantly different (Leech, Barrett & Morgan, 2011). Inspection of the scree plot showed that eigenvalues departed from linearity with two factors (Figure 1), which explained 36.4% of the total variance. Table 3 shows factor loadings of CBI-BA items for the total sample of cancer patients (N=438); 12 of 14 items loaded on 2 factors, with 7 items loading on Factor 1 and 2 items loading on Factor 2, according to the a priori criteria for factor loading and cross-loading. Factor 2 did not meet the a priori criterion for number of items loaded. Acceptable reliability evidence was maintained with a 7-item scale, with Cronbach's alpha of .81(Table 2), and inter-item correlation increased from .23 to .38.

For women with breast cancer, the subject-to-item ratio was 12:1. The KMO measure of sampling adequacy was .805 and the Bartlett test was significant (p = 001). The scree plot (Figure 2) showed a departure from linearity with 4 factors that explained 47.5% of the variance. Table 4 shows factor loadings of CBI-BA items for the subsample of women with breast cancer (n=168); 11 of 14 items loaded on 4 factors with 7 items loading on Factor 1, 2 items on Factor 2, and 1 item each on Factors 3 and 4, according to the a priori criteria for factor loading and cross-loading. Factors 2, 3, and 4 did not meet the a priori criterion for number of items loaded. Acceptable reliability evidence was

maintained with a 7-item scale, with Cronbach's alpha of .83 (Table 2), and inter-item correlation increased from .24 to .40.

Table 5 presents the results of cognitive interviews with 30 participants about their understanding of CBI-BA items. Every participant correctly understood items 12 and 14. The number of incorrect interpretations of the remaining 12 items varied from 1 to 7, which did not meet the threshold for item revision.

For the FACT-BA in women with breast cancer (n=56), the subject-to-item ratio was 1.5:1. Although the Bartlett's Test of Sphericity was significant (p=.000), the KMO test was .577, indicating the sample was inadequate for factor analysis. The scree plot (not shown) showed departure from linearity with 11 factors, which explained 66.8% of the total variance. When the Additional Concerns subscale was excluded, the sample size was 167, with a subject-to-item ratio of 6:1. The KMO measure of sampling adequacy was .846 with significant Bartlett's Test of Sphericity (p=.000). The scree plot showed departure from linearity with 6 factors (Figure 3); a 6-factor solution explained 54.1% of the total variance. Table 6 shows loading of 7 items on Factor 1, 6 items on Factor 2, and 5 items each on Factors 3 and 4. Factors 5 and 6 had an insufficient number of item loadings to constitute a factor according to the a priori criterion.

Discussion

The sample for this study was 438 Arabic-speaking adult men and women diagnosed with cancer and recruited from two cancer centers in Riyadh, Saudi Arabia. Three-quarters of the sample was female and the average participant was middle-aged. Consistent with the skewed gender distribution, 38% of the sample had a diagnosis of breast cancer. Other common cancer diagnoses were gastrointestinal and hematologic. The psychometric properties of the CBI-BA were assessed in the general cancer

population and in women with breast cancer with both 14- and 12-item versions. Cognitive interview about the meaning of CBI-BA items was evaluated in 30 participants randomly selected from the total sample. The FACT-BA was tested for reliability and validity evidence in 167 women with breast cancer.

Although the reliability estimate ($\alpha \geq .78$) for the CBI-BA in Arabic general cancer patients was lower than α estimates (.84 - .88) of the CBI-B in English-speaking general cancer patients (Heitzmann et al., 2011; Merluzzi, Nairn, Hegde, Martinez Sanchez, & Dunn, 2001), the estimate exceeded the a priori criterion and is considered an acceptable level of internal consistency for a newly-developed instrument (Nunnally & Bernstein, 1994). The same is true in Arabic women with breast cancer ($\alpha \geq .79$). Average inter-item correlations in both the total sample and the subsample were marginally higher with the 12-item CBI-BA ($r \geq .24$ - .26) than with the 14-item instrument ($r < .23$ - .24). Both 12-item and 14-item CBI-BA scores were skewed in the general cancer patients, which may have influenced the factor analysis results and, consequently, the evidence for construct validity of the CBI-BA. Log-linear transformation of the data did not affect the EFA results.

The primary objective of EFA is to determine the minimum number of common factors (i.e., those that reflect shared variance with multiple items on the instrument) that explain the correlations in the data (Ferguson & Cox, 1993). Each item was expected to correlate to some degree with every other item on the CBI-BA given that the subscale concepts all relate to SEC with cancer. Heitzmann et al. (2011) reported a 4-factor solution using EFA with oblique rotation with data from a large sample ($N = 735$), and then supported their findings with confirmatory factor analysis with data from two

different samples (N = 199 and N = 370). However, the criterion for number of loaded items per factor was less than recommended (DeVellis, 2012) in Factor 3 (participation in medical care); two items loaded compared with the recommended three or more.

In the present study, the Varimax method of orthogonal rotation was selected to provide a simple structure. Nonetheless, oblique rotation, as used by Heitzmann et al. (2011), was considered in repeat EFAs for the CBI-BA to see if the assumption of factor inter-correlations yielded a more appropriate factor solution. To determine the optimal factor solution for the CBI-BA in 438 Arabic-speaking cancer patients, several EFAs were conducted for both the 12-item CBI-BA, consistent with the optimal solution in the English version (Heitzmann et al.), and the publicly posted 14-item instrument translated into Arabic (Algamdi & Hanneman, In press-a). EFAs for the 14-item CBI-BA, with both oblique and orthogonal rotations, produced a 3-factor solution with 6, 2, and 2 items loaded according to the a priori criteria on the three respective factors; 4 items had cross-loadings < .20. The criterion for number of items per factor was not met for Factors 2 and 3; therefore, only one factor with 6 items was the final solution. In the EFAs for the 12-item instrument, oblique and orthogonal rotations yielded a 2-factor solution with 7 and 2 items loading according to the a priori criteria; 3 items had cross loadings < .20. The criterion for number of items per factor again was not met for Factor 2; therefore, only one factor with 7 items was the final solution. Although the EFAs for the 14-item instrument explained marginally greater variance (37.9% vs. 36.4%), EFAs for the 12-item instrument accounted for a slightly higher number of items (7 vs. 6). Reported here are the EFA findings for the 12-item instrument, to preserve a larger number of items, and the oblique rotation loadings, which were higher than the orthogonal rotation factor

loadings. Thus, the optimal solution for factor analysis of the CBI-BA is one factor, which is consistent with a unidimensional construct of SEC with cancer. The findings suggest that a 7-item CBI-BA can capture the construct adequately in the Arabic population.

From a conceptual stance, the loading of 7 items on one factor makes sense. Items 1 (maintaining self-reliance), 2 (maintaining positive attitude), 3 (maintaining sense of humor), 6 (maintaining activities), 7 (trying to be calm throughout treatments), 8 (participating in treatment decisions), and 13 (coping with physical challenges) are all concerned with "maintaining independence and positive attitude." The seven items represent the majority of the items in the first three subscales of the CBI-B (Heitzmann et al., 2011).

Items 10 (seeking social support) and 11 (sharing my worries and concerns with others) loaded strongly on Factor 2. Although two items are generally considered an inadequate number to constitute a subscale, they explained significant variance in SEC with coping, as shown in Figure 1. The strong (> .50), clean (i.e., no cross-loading) loadings of these items were unexpected. Understanding of item 10 was problematic in the earlier cognitive interviews during development of the CBI-BA (Algamdi & Hanneman, In press-a). Items 11 and 4 (cross-loaded on Factor 1) involve expressing feelings, which is a conservative issue in Arabic culture, especially for cancer patients (Qasem, 2010; Alqaissi & Dickerson, 2010). Arabs prefer to avoid talking about their illness from fear of being placed in a sympathetic position (Doumit, Huijer, Kelley, El Saghir & Nassar, 2010a). Item 12 (managing nausea and vomiting) did not meet the factor loading criterion. Study participant interviews revealed that nausea and vomiting

are perceived as side effects that do not necessarily occur in all cancer patients, and, therefore, patients cannot predict what their reaction would be when it happens. Furthermore, participants indicated that they consider all side effects as "physical challenges" (item 13).

For the subsample of women with breast cancer (n=168), the same steps in producing an optimal EFA solution were followed as with the general cancer patients. Orthogonal rotation produced higher loadings than oblique, suggesting that the factors are not correlated (Afifi, May & Clark, 2012). EFAs for the 14-item version explained relatively larger variance (47.5% vs 43.5%) and produced more items (7 vs 6) than EFAs for the 12-item version. The optimal solution of the CBI-BA was 1 factor with 7 loaded items with the 14-item version, in contrast to the total sample EFA where 7 items loaded on the 12-item version; the item loadings were slightly different. All but one of the same items that loaded in the general cancer sample loaded in the subsample of women with breast cancer, albeit the strength of the loadings varied. Item 14 (trying to be calm while waiting for appointment) loaded on the factor in place of item 8 (active participation in treatment decisions). Participation in treatment decisions works differently in Middle-eastern, and especially Arabic, women, who need to involve husband or family members in decision making (Gilbar & Gilbar, 2009; Hammad, Kysia, Rabah, Hassoun & Connelly, 1999); consequently, the item loaded on a separate factor. Item 14 (trying to be calm while waiting at least one hour for my appointment), along with items 7 (trying to be calm throughout treatments) and 2 (maintaining a positive attitude) may be viewed as positive attitude.

For the cognitive interview findings, the criterion for considering revision was not met; none of the items received more than nine constructive comments. Item 2 (maintaining positive attitude) had seven wrong explanations and Item 10 (seeking social support) had six wrong explanations, both within an acceptable range.

The total FACT-BA scale had adequate evidence of reliability. Cronbach's alpha in the Arabic-speaking sample (α= .88) was somewhat lower than, but comparable with, estimates of internal consistency in English-speaking (Brady et al., 1997) and Persian-speaking (Patoo, Allahyari, Moradi, & Payandeh, 2015) samples, which were .90 and .92, respectively. The PWB, SWB, EWB, and FWB subscales also had acceptable reliability estimates (.75 - .89), with subscale alphas comparable with estimates in the English- and Persian-speaking samples (.69 - .86 and .71 - .93, respectively). Alpha level of the Additional Concerns (Breast Cancer) subscale was the same (α = .63) in the Arabic-, English-, and Persian-speaking samples, and did not meet the a priori criterion for the present study. According to Brady et al. (1997), this subscale was added to the FACT-G to make the assessment of QOL more suitable for the breast cancer population.

Because the Additional Concerns subscale did not have adequate reliability evidence and had a low participant response rate, multiple EFAs were conducted for the FACT-BA, with and without this subscale, using orthogonal and oblique rotations. When the breast cancer subscale was included, EFA solutions were unstable due to insufficient sample size. The low response rate in the Additional Concerns subscale was largely due to items 4 (I feel sexually attractive) and 9 (I am able to feel like a woman), which reflect femininity. Femininity is considered a private issue in the gender-constrictive Arabian culture (Amin, Almulhim & Almeqihwi, 2009; Sarhan, 2009). The same response

patterns were seen in the preliminary psychometric testing of the FACT-BA in Arabic-speaking women with breast cancer in Houston, Texas (Algamdi & Hanneman, in press-b), validating the cultural roots of reluctance to respond to items of a sexual nature, in contrast to the local environment or setting. Thus, the breast cancer subscale does not help determine QOL in Arabic-speaking women with breast cancer.

The Arabic version of the FACT-G (FACT-GA), on the other hand, showed adequate evidence of construct validity for measuring QOL in Arabic-speaking women with breast cancer. Although the sample size was relatively small (n = 167), the subject-to-item ratio in the present study (6:1) exceeds the minimum ratio recommended (Gorsuch, 1983). For the EFAs conducted on the FACT-GA, the data met the criterion for sampling adequacy (Leech, Barrett & Morgan, 2011; DeVellis, 2012). With orthogonal rotation, all items loaded according to theoretical expectation, except for item 7 (I am forced to spend time in bed) of the PWB subscale, items 1 (I am able to work [include work at home]) and 4 (I have accepted my illness) of the FWB subscale and item 2 (I am satisfied with how I am coping with my illness) of the EWB subscale – all of which showed cross-loadings on two or more factors, albeit the loadings were highest on the original subscale. Oblique rotation yielded a more optimal solution; all items loaded according to theoretical expectation except item 1 (I am able to work include work at home) in the FWB subscale and item 2 (I am satisfied with how I am coping with my illness) in the EWB subscale. Items 1 (I feel close to my friends) and 3 (I get support from my friends) in the SWB subscale loaded together on a separate factor with both rotational methods. Perhaps the latter two items concerning relationships with friends loaded differently from theoretical expectations because Arabian women tend to conceal

a breast cancer diagnosis from friends to avoid stigma (Alqaissi & Dickerson, 2010; Doumit, El Saghir, Abu-Saad Huijer, Kelley, & Nassar, 2010b). Arabic women with breast cancer disclose their diagnosis only to close relatives, and not to friends and extended family members (Kobeissi et al., 2014). Reliability evidence for the FACT-GA was adequate (Cronbach's alpha = .89), and inter-item correlation was .26.

The study had several limitations. Social desirability response set was not tested, which might have influenced the findings because the instruments are self-report questionnaires and participants may have selected the most favorable responses to satisfy the investigator (Van de Mortel, 2008). Three-fourths of the total sample was female, which may limit generalizing the findings to Arab males diagnosed with cancer. This limitation is mitigated, however, because 107 men is a large sample size. The stage of cancer of women with breast cancer was not investigated, and the extent and severity of disease may affect variation in the responses to the FACT-BA breast cancer subscale.

Conclusions, Recommendations, and Clinical Implications

The goal of this study was to test the psychometric performance of two Arabic instruments: the CBI-BA for measuring SEC with cancer and the FACT-BA for measuring QOL in women with breast cancer. Reliability testing indicates an adequate level for considering use of both instruments in future studies: the CBI-BA for all patients with cancer and the FACT-GA for women with breast cancer. The CBI-BA has acceptable evidence of validity for Arabic-speaking cancer patients; a unidimensional scale with 7 items captures the construct of SEC with cancer. The FACT-BA does not have acceptable evidence of validity in Arabic-speaking women with breast cancer; however, the FACT-GA, which excludes the Additional Concerns (breast cancer)

subscale, does. A 23-item FACT=GA, with four subscales, captures the construct of QOL in Arabic women with breast cancer.

It is recommended that items regarding intimate issues in the FACT-GA be either optional or excluded from the instrument due to the conservative nature of Arabic cultures. Further testing of the CBI-BA and FACT-GA in Arabic populations is recommended due to the large variation in Arabic words that can serve as synonyms for English words. An instrument that can be used with a large percentage of the Arabic population is desirable, and psychometric testing in parts of the Middle East outside of Riyadh is recommended.

Concealment (i.e., reluctance to divulge) appears to influence responses to emotional and sexual-related concerns in the Arabic population, and this needs to be considered when deciding to exclude or make optional such items. Although willingness to address such issues may change over time, the majority of Saudi women with breast cancer consider these areas of women's health to be taboo for discussion with health care providers or researchers. We hope this observation enlightens research and practice with regard to the Arabian culture. Understanding culturally-sensitive issues that need to be avoided would be important when dealing with cancer patients at any stage of illness.

Clinical Resources

- World Health Organization: http://www.who.int/nmh/countries/sau_en.pdf?ua=1
- The Notre Dame Lab for Psycho-Oncology Research: http://psychooncologynd.com/

- Functional Assessment of Chronic Illness Therapy (FACIT) Measurement System: http://www.facit.org/FACITOrg/Questionnaires

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Table 1

Demographic characteristics of the total sample (all patients with cancer).

All cancer patents	N= 438
Age	
Mean (±SD)	48.2 (±12.8)
Gender	
Male (%)	107 (24.4%)
Female (%)	331 (75.5%)
Diagnoses	
Breast	168 (38%)
Digestive/gastrointestinal	68 (16%)
Hematologic	44 (10%)
Gynecologic	37 (8%)
Multiple cancers	32
Endocrine/ neuroendocrine	22
Musculoskeletal	16
Neurologic	15
Respiratory/ thoracic	10
Genitourinary	10
Unknown primary	10
Head & neck	5
Otolaryngologic	1
Total	438

Table 2

Cronbach's alpha coefficients of the Cancer Behavior Inventory-Brief Arabic (CBI-BA) and the Functional Assessment of Cancer Therapy-Breast Arabic (FACT-BA)

	All cancer patents (N=438)		Women with breast cancer (n=168)	
14- item CBI-BA	.79		.80	
12- item CBI-BA	.78		.79	
7-item CBI-BA	.81		.83	
FACT-BA	Without item 7 (social) (n=56)	Without item 4 (concerns) (n= 165)	Without optional items (n= 165)	With optional items (n= 167)
Total scale	.88	.89	.89	.88
Physical Well-being Subscale	-	-	-	.86
Social Well-being Subscale	.73	-	-	.75
Emotional Well-being Subscale	-	-	-	.75
Functional Well-being Subscale	-	-	-	.89
Breast Cancer Sub-scale (Additional Concerns)	-	.63	.63	.63

Table 3

Rotated factor loadings from exploratory factor analysis using principal axis factoring with promax rotation for 12-item Cancer Behavior Inventory- Brief Arabic (CBI-BA) (N=438)

Item Number	CBI-BA Item	Factors	
		1	2
2	Maintaining a positive attitude	.761	-.064
1	Maintaining self-reliance	.747	-.141
6	Maintaining activities	.659	-.032
7	Trying to be calm throughout treatments and not allowing scary thoughts to upset me	.600	.041
13	Coping with physical challenges	.595	-.053
3	Maintaining a sense of humor	.591	.054
8	Actively participating in treatment decisions	.443	.141
9*	Asking physicians questions	.372	.334
12	Managing nausea and vomiting (whether or not I have had these problems in the past)	.293	.248
11	Sharing my worries or concerns with others	-.095	.720
10	Seeking social support (seeking help from others such as family or friends	-.095	.589
4*	Expressing feelings about the disease	.228	.345

Note. *Cross-loaded item.

Table 4

Rotated factor loadings from exploratory factor analysis using principal axis factoring with varimax *rotation for the 14-item Cancer Behavior Inventory-Brief Arabic (CBI-BA) in women with breast cancer (n=168)*

Item Number	CBI-BA item	Factor			
		1	2	3	4
2	Maintaining a positive attitude	.812	.065	.195	.006
6	Maintaining activities	.681	-.043	-.072	.209
3	Maintaining a sense of humor	.668	.199	.024	.070
1	Maintaining self-reliance	.657	.028	.163	-.016
13	Coping with physical challenges	.568	.065	.174	-.008
7	Trying to be calm throughout treatments and not allowing scary thoughts to upset me	.551	.083	.229	.035
14	Trying to be calm while waiting at least one hour for my appointment	.514	.058	.130	-.063
12*	Managing nausea and vomiting	.358	.276	-.055	.137
4	Expressing feelings about the disease	.271	.760	.024	.092
5	Putting things out of my mind at times	-.052	.650	. 246	.052
8	Actively participating in treatment decisions	.371	.174	.756	.159
9*	Asking physicians questions	.195	.310	.390	.249
10	Seeking social support (seeking help from others such as family or friends)	.077	.006	.108	.695
11*	Sharing my worries or concerns with others	-.077	.401	.089	.567

Note.. *Cross-loaded item

Table 5

Results of cognitive interviews (n=30) about the Arabic version of the Cancer Behavior Inventory-Brief

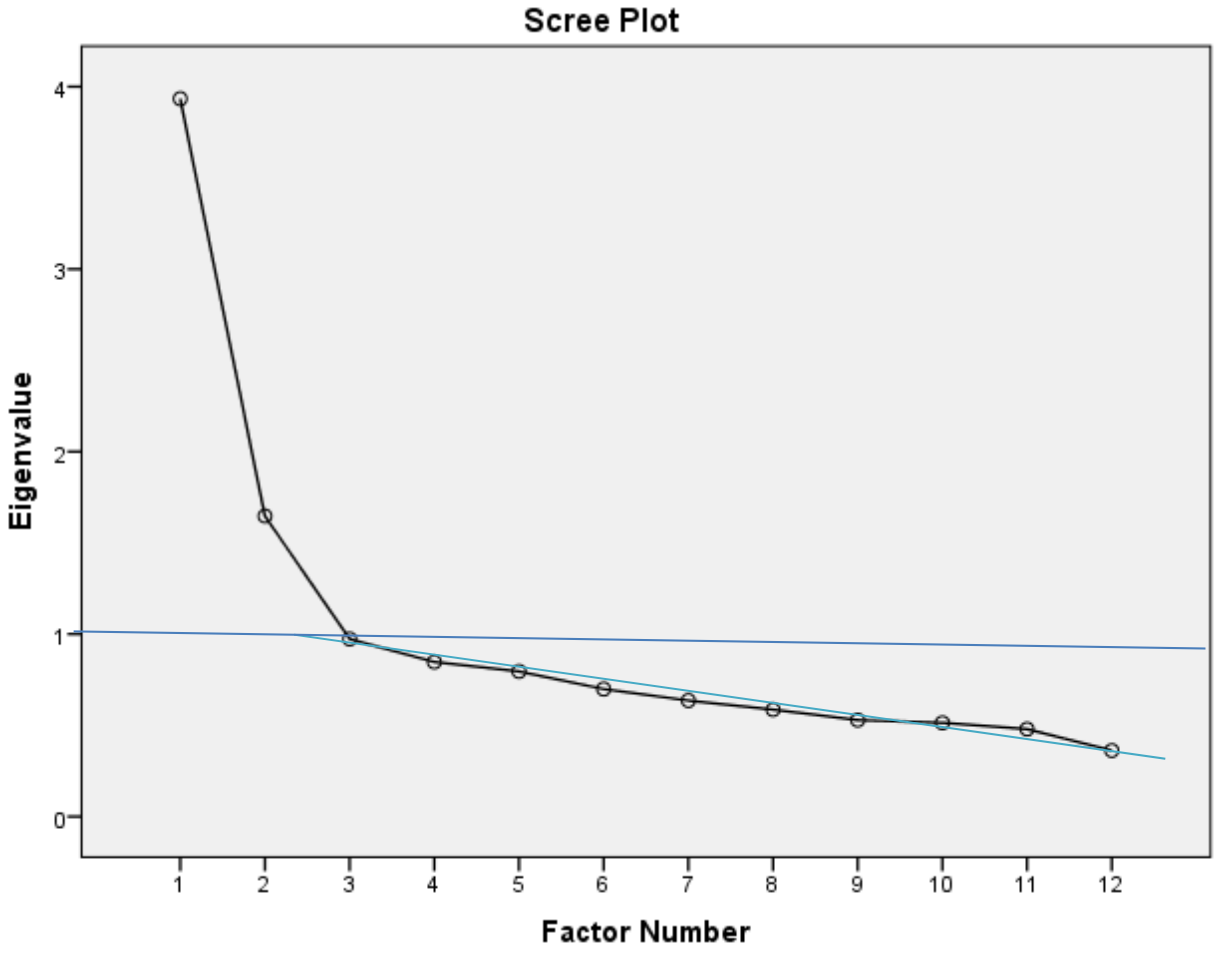
	Items	# correct explanations	# wrong explanations	Recommended paraphrasing	Comment
1-	Maintaining self-reliance	28	2	Rely on self or self-confidant	
2-	Maintaining a positive attitude	23	7		
3-	Maintaining a sense of humor	26	4		
4-	Expressing feelings about the disease	28	2		
5-	Putting things out of my mind at times	27	3		
6-	Maintaining activities (work, home, hobbies, social)	29	1		
7-	Trying to be calm throughout treatments and not allowing scary thoughts to upset me	29	1		
8-	Actively participating in treatment decisions	27	3		
9-	Asking physicians questions	29	1		Similar to item 8
10-	Seeking social support (seeking help from others such as family or friends	24	6	Explain type of support	Similar to item 1
11-	Sharing my worries or concerns with others	29	1		Similar to item 5
12-	Managing nausea and vomiting (whether or not I have had these problems in the past)	30	0	Change manage to deal with or cope	
13-	Coping with physical challenges	27	3		Similar to item 12
14-	Trying to be calm while waiting at least one hour for my appointment	30	0		

Table 6

Rotated factor analysis of Functional Assessment of Cancer Therapy-Breast Arabic with exclusion of the Additional Concerns (breast cancer) subscale (n=167)

	Factor					
	1	2	3	4	5	6
physical7r	.762	-.085	-.112	-.021	.117	.530
physical1r	.738	-.009	.023	-.053	-.094	-.076
physical6r	.731	-.164	.265	.139	-.023	.007
physical4r	.713	.014	.095	.049	-.148	-.034
physical3r	.669	-.074	-.029	-.072	.092	.030
physical2r	.584	.091	.151	-.085	-.146	.222
physical5r	.559	-.058	.238	-.018	.096	.064
functional7	-.170	.872	.113	.135	-.044	.038
functional3	.046	.845	.052	-.041	-.024	.048
functional4	-.251	.813	.105	-.131	-.018	.157
functional6	-.009	.697	.167	-.007	.042	.092
functional2	.321	.642	-.308	.029	.067	-.091
functional5	.228	.463	.065	.237	-.098	.006
function1*	.433	.522	-.253	-.006	.070	-.046
emotion4r	.165	-.058	.670	-.100	.183	-.233
emotion6r	.059	.019	.651	.054	-.124	.079
emotion1r	.239	.117	.629	.000	-.006	-.062
emotion5r	-.068	.068	.549	.161	-.090	.306
emotion3r	.097	.134	.484	-.143	.174	.086
social5	.037	-.129	-.059	.845	-.004	-.020
social4	-.021	.090	-.049	.707	-.001	-.115
social2	-.092	-.098	.037	.548	.263	.025
social7	.015	.178	-.045	.476	.046	.118
social6	-.053	.039	.225	.454	.023	-.093
social1	.017	.001	.096	.069	.721	.052
social3	-.116	.010	-.058	.113	678	.151
emotion2*	-.090	.368	.073	-.117	.164	.405

Note. *Cross-loaded item; r, reverse-scored.



*Figur*e 1. Scree plot for exploratory factor analysis of the Cancer Behavior Inventory- Brief Arabic *(N*=438)

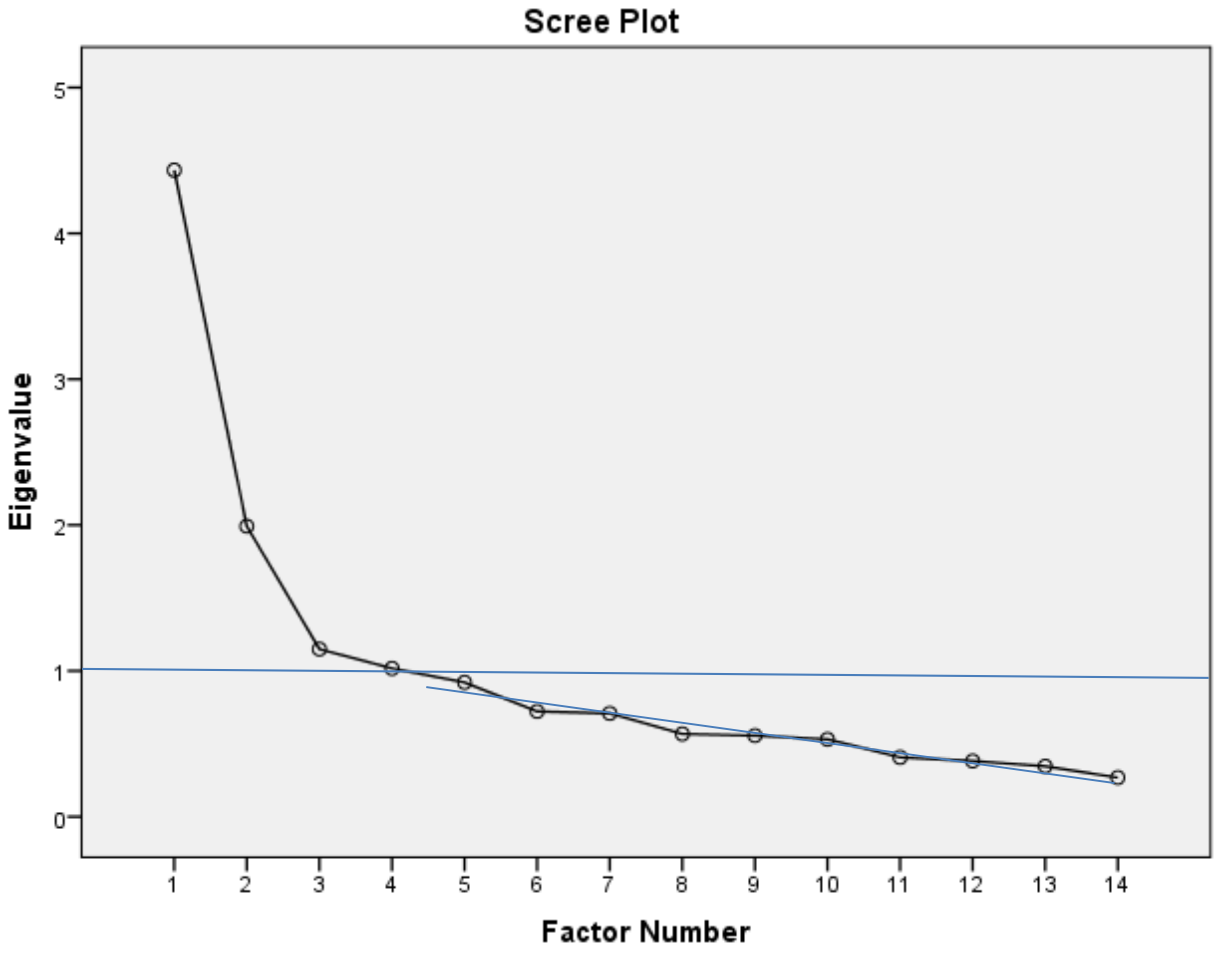


Figure 2. Scree plot for exploratory factor analysis of the Cancer Behavior Inventory- Brief Arabic for women with breast cancer *(n*=168)

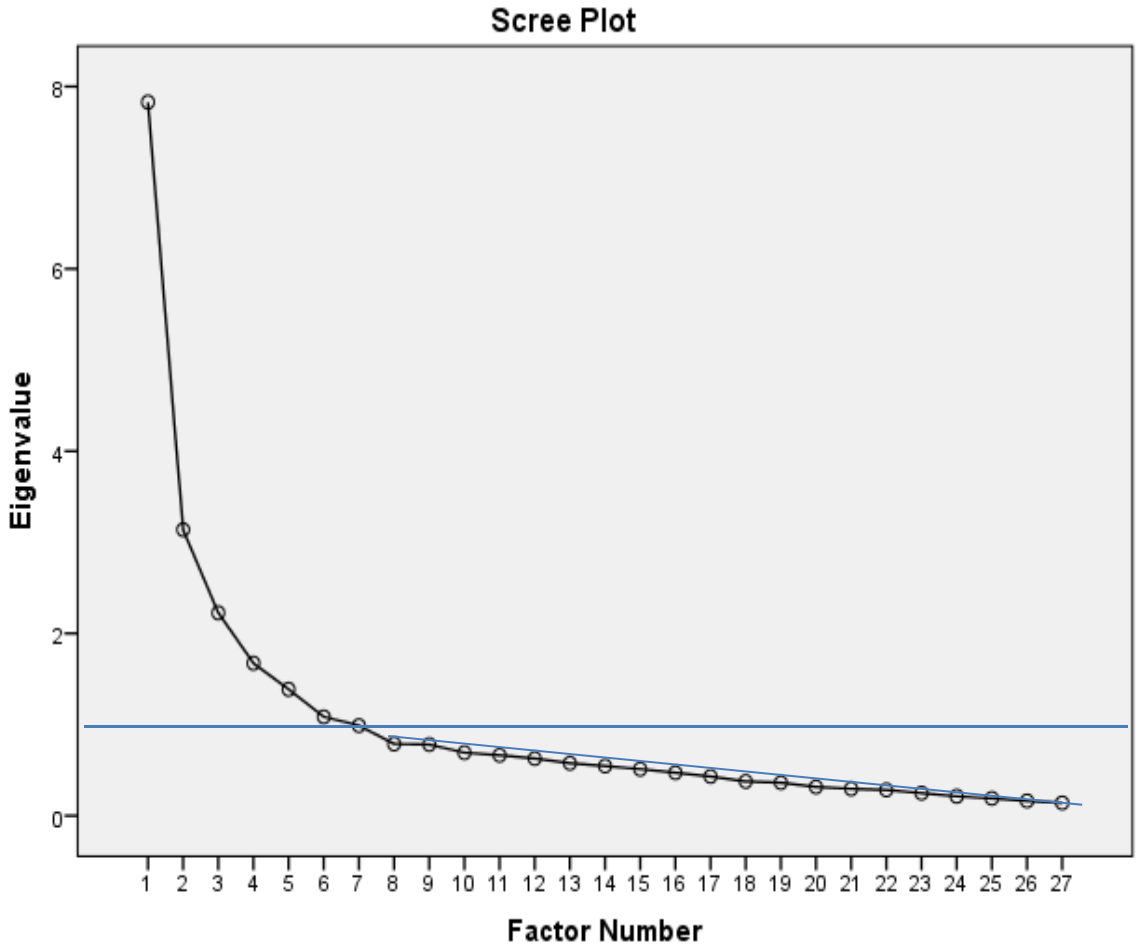


Figure 3. Scree plot of Functional Assessment of Cancer Therapy-Breast Arabic excluding the Additional Concerns (breast cancer) subscale

Journal of Nursing Measurement

Development of an Arabic Translation of the Cancer Behavior Inventory-Brief

--Manuscript Draft--

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Abstract:	Purpose: The objective was to develop an Arabic version of the Cancer Behavior Inventory-Brief (CBI-B). Methods: The CBI-B was translated into Arabic using two forward and back translations. A translational validity index (TVI) was computed from review by an expert panel. Results: Both back translations had issues with word choice, grammar, and meaning, which were resolved by selecting specific items from each forward translation. Item TVI was 0.83 - 1.0, with an overall mean of 0.95. Conclusion: The Arabic version of the CBI-B (CBI-BA) has acceptable evidence of translation validity. Two rounds of forward and back translation of the CBI-BA were needed to ensure semantic equivalence of the CBI-BA with the original instrument. Further psychometric testing with cognitive interviewing is recommended.

Abstract

Purpose: The objective was to develop an Arabic version of the Cancer Behavior Inventory-Brief (CBI-B).

Methods: The CBI-B was translated into Arabic using two forward and back translations. A translation validity index (TVI) was computed from review by an expert panel.

Results: Both back translations had issues with word choice, grammar, and meaning, which were resolved by selecting items from each forward translation. Item TVI was 0.83 - 1.0, with an overall mean of 0.95.

Conclusion: The Arabic version of the CBI-B (CBI-BA) has acceptable evidence of translation validity. Two rounds of forward and back translation of the CBI-BA were needed to ensure semantic equivalence of the CBI-BA with the original instrument. Further psychometric testing with cognitive interviewing is recommended.

Keywords: Arabic, Cancer Behavior Inventory - Brief, translation validity, measurement, semantic equivalence

Introduction

Globally, more than 1.6 million new cases of cancer are diagnosed and nearly 600,000 people die from it every year (Howlader et al., 2014). In the Middle East, cancer is the fourth leading cause of death (World Health Organization [WHO], 2010). According to One World Nation Online (n.d), Arabic is the official language of 26 countries distributed in Asia and Africa with a collective population of approximately 300 million citizens (Salim et al., 2009).

Self-efficacy is conceptually defined as an individual's belief in his or her abilities to carry out a specific behavior under challenging conditions (Bandura, 1977). Measuring self-efficacy for coping (SEC) with cancer is important to understanding cancer populations' attitudes toward their condition. The Cancer Behavior Inventory-Brief version (CBI-B) is used to measure SEC (Heitzmann et al., 2011), and translated versions of the CBI-B are needed to measure SEC of non-English speaking populations.

Culture has a complex influence on patient behaviors because it provides different sources of information to patients developing SEC with cancer (Bandura, 2002; Oettingen, 1995). More than verbatim translation, semantic equivalence needs to be considered in translating instruments from one language to another. Semantic equivalence means that each item of the original instrument has the same meaning in the target culture after translation of the instrument into the language of the target culture (Beck, Bernal & Froman, 2003). The WHO (n.d.) advocates four steps in the translation process: "forward translation, expert panel back-translation, pretesting and cognitive interviewing, and [the] final version" (p. 1). Forward and back translations are necessary to obtain instruments of good quality for use in different cultures (Sperber, 2004). The

translators must be fluent in English, but their mother tongue needs to be the target language. Moreover, translations must seek conceptual equivalence to the words and phrases of the original instrument. Expert panel reviews of translations ideally use multidisciplinary teams of individuals who are bilingual experts in the field of the translated instrument (Ohrbach, Bjorner, Jezewski, John & Lobbezoo, 2009). Such teams play a major role in determining the differences between, and alternatives for, the translated version as compared with the original.

Translational validity assesses the extent to which the translated instrument reflects the content of the original instrument (Drost, 2011). Similar to assessment of content validity, wherein a content validity index is used to rate the relevance of content in the instrument (Lynn, 1986), a translational validity index (TVI) may be used to rate the equivalence of the original and translated instruments. TVI is determined according to differences and similarities between the translated instrument and the original based on expert opinion.

Guidelines proffered by others for quality of instrument translations (Pan & Puente, 2005) address reliability, completeness, accuracy, and cultural appropriateness of the translated instrument. *Reliable* indicates that the translated instrument conveys the meaning of the original. *Complete* indicates that no information in the original is supplemented or deleted in the translated instrument. *Accurate* refers to proper grammar and spelling. *Culturally appropriate* indicates that the concepts of the instrument, and how participant responses are elicited, are relevant to the target population. A review panel and adjudicators assess the foregoing criteria.

In this paper, the authors report the results of the first two steps of the WHO process of translating an instrument: forward and back translation and expert panel review. The objectives of this study were to (1) forward and back translate the CBI-B into Arabic, and (2) assess the TVI of the final forward translated version of the CBI-BA. Documentation of each step of the translation process is recommended for tracking different versions of the instrument as it proceeds through the various phases of development and testing by providing an audit trail of decisions made and their rationale (Pan & Puente, 2005).

Background and Conceptual Framework

The translation process recommended by the WHO (n.d.) is shown in Figure 1. The original instrument was translated from English to Arabic two times (Forward translations 1 and 2). Then back translations 1 and 2 were compared to obtain a final version of the forward translation in Arabic. This "final" version was reviewed by the expert panel.

Cancer Behavior Inventory-Brief (CBI-B)

The CBI-B is a 14-item, paper and pencil, self-report scale developed to measure SEC of cancer patients (Heitzmann et al., 2011). Heitzmann et al. reported Cronbach's alpha of 0.84 to 0.88, indicating adequate evidence of internal consistency reliability. Factor analysis (N = 735) demonstrated evidence of construct validity for the CBI-B; the hypothesized four subscales were supported by the loading of all items on a 4-factor solution, according to theoretical expectations. The CBI-B uses a 9-point Likert-type response format (1 = not at all confident, 9 = totally confident). The sum of the item scores indicates the level of SEC, with high scores reflecting strong SEC.

Methods

The translation process illustrated in Figure 1 was used to translate the CBI-B to the Arabic version (CBI-BA). The original instrument was forward and back translated twice, then expert panel review was done to determine semantic equivalence between the original and the translated instruments. The purpose of two translations was to produce an Arabic version with acceptable semantic equivalence to the CBI-B.

Translation of the CBI-B to the CBI-BA

Forward and back translations

Two individuals bilingual in English and Arabic, with the latter as their native language, and who had lived in Arabic cultures were selected to do the translation. First, an Arabic-speaking professional translator in Saudi Arabia translated the CBI-B from English to Arabic. Then, an Arabic-speaking translator in the United States translated the Arabic version of the CBI-B back into English. The authors compared the back-translated CBI-BA with the CBI-B and noted several differences in word choice and/or grammar.

According to Maneesriwongul and Dixon (2004), if the back translation does not achieve semantic equivalence, the translation should be replicated. Therefore, a second forward translation was done in the United States by an Arabic-speaking translator, with a background in medical terminology, and the first author did the back translation.

Expert panel review

The panel review represented the opinions of six Arabic-speaking medical and linguistic experts regarding equivalence between the translated (CBI-BA) and the original (CBI-B) instruments. The expert panel included one oncologist, one general surgeon, two

oncology registered nurses, one oncology technician, and one English literature specialist. The experts independently completed a translational validity form regarding the extent of similarities and differences between the Arabic and English versions for each item of the translated instrument. “Similar” and “somewhat similar” options were considered acceptable equivalence, and “different” and “somewhat different” responses were considered nonequivalent. More than one response of “different” or “somewhat different” indicated the need for revision. A TVI was used to quantify the experts’ judgment.

Results

The authors detected issues with the CBI-BA when comparing the CBI-B and the first back translated version. In the instructions, the word “treatment” was back translated to “medication,” and the word “behavior” was back translated to “act.” Four instrument items had problems with word choice, grammar, and translation. Item 5, “putting things out of my mind at times,” was back translated to “freeing my mind from thinking for a while;” the back translation had a different meaning. Item 7, “trying to be calm throughout treatments and not allowing scary thoughts to upset me,” was back translated to “trying to remain calm while in treatment and blocking frightening thoughts,” which is not a faithful translation of the phrase. Item 9, “asking physicians questions” was back translated to “asking questions to the doctor,” which is grammatically incorrect. The word “concerns” in item 11 was back translated into “interests,” which has a different meaning.

When the CBI-B and the second back translation were compared, issues appeared with Items 2, 5, 10, and 12. Item 2, “maintaining a positive attitude,” was back translated

to “maintaining a positive direction,” which has a different meaning. Item 5, “putting things out of my mind at times,” was back translated to “putting off thinking about things from time to time;” this is different wording, but conveys the same meaning. Item 10, “seeking social support,” was back translated to “looking for social support,” which also uses a different word but communicates the same meaning. Item 12, “managing nausea and vomiting,” was back translated to “dealing with nausea and vomiting,” which does not convey the intended meaning.

The authors selected the items that were closest to the original instrument from either the first or second forward translation (Table 1); the selections were based on the back translation of each version. The bolded items in Table 1 were used for the CBI-BA. This version of the forward translation and the original instrument were sent to an expert panel for review. Item CVI varied between 0.83 and 1.0, with an overall mean CVI of 0.95 (Table 2), indicating adequate evidence of translation validity and that the CBI-BA achieved semantic equivalence to the CBI-B.

Discussion

The CBI-B was translated from English to Arabic using the WHO process of translating an instrument, which includes back translation. Back translation of instruments is an effective method to validate the meaning of the original instrument (Sperber, 2004). Two back translations were compared to obtain more accurate and meaningful words and/or phrases that were close to the original instrument’s meaning. Bilingual expert review of translated instruments is a method to validate the translated instrument (Sperber, 2004). The multiple, bilingual translators had lived in Arabic cultures and could draw on their language and cultural backgrounds to assess semantic

equivalence. Improper word choices, grammatical mistakes, and incorrect meanings were issues with both back translations. The issues were resolved by author selection of some words/phrases from forward translation 1 and some from forward translation 2. The TVI indicates that the current version of the CBI-BA has adequate evidence of semantic equivalence to the original instrument.

Arabic language variations in word use can raise issues when translating concepts because there are many synonyms in Arabic for English words. This is a potential limitation of the present study, as the goal is to produce an instrument that can be used broadly with Arabic-speaking populations. The second back translation was done by the first author, which could be a source of bias.

Conclusions and Recommendations

The CBI-BA has evidence of acceptable translational validity and is semantically equivalent to the CBI-B. Further testing with cognitive interviewing is recommended to validate interpretation of CBI-BA items by Arabic-speaking cancer patients. Psychometric testing is required to assess evidence for validity and reliability of the CBI-BA.

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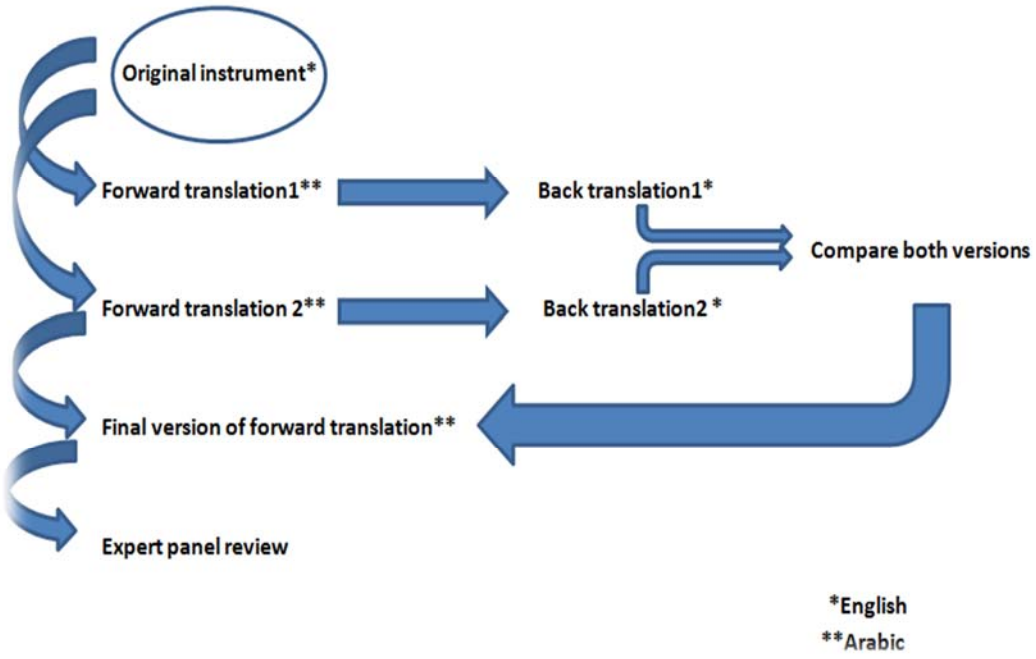

Figure 1. The process used to translate the Cancer Behavior Inventory - Brief to the Cancer Behavior Inventory – Brief Arabic

Table 1

Back translated versions of the CBI-B with reasons for selection for the CBI-BA

Original item on the CBI-B	Back translated item version 1	Back translated item version 2	Reason for selection
1. Maintaining independence	**Maintaining independence**	Maintain independence	Same as original instrument
2. Maintaining a positive attitude	**Maintaining a positive attitude**	Maintaining a positive direction	Same as original instrument
3. Maintaining a sense of humor	**Maintaining a sense of humor**	Maintain a sense of humor	Same as original instrument
4. Expressing feelings about cancer	Expressing my feelings about cancer	Expression of feelings about cancer	Original
5. Putting things out of my mind at times	Freeing my mind from thinking for a while	**Putting off thinking about things from time to time**	The second meaning is easier to understand and closer to the original item.
6. Maintaining activities (work, home, hobbies, social)	Keeping active (work, home, hobbies and social activities)	**Maintaining activities (work, home, hobbies and social activities)**	The second meaning is easier to understand and closer to the original item.
7. Trying to be calm throughout treatments and not allowing scary thoughts to upset me	Trying remain calm while in treatment and blocking frightening thoughts	**Trying to be calm during treatment and avoiding frightening ideas that upset me**	The second translation is closer to the original item.
8. Actively participating in treatment decisions	Taking an active role in treatment decisions	**Participating actively in treatment decisions**	The second translation is easier to understand.
9. Asking physicians questions	Asking questions of the doctor	**Asking questions of the physician**	Grammar mistakes appear in both translations, and the word "physician" is more accurate, especially within the medical field.
10. Seeking social support	**Seeking social support**	Looking for social support	Close to the original item
11. Sharing my worries or concerns with others	Sharing worries and interests with others	**Sharing my fears and concerns with others**	Concerns convey the intended meaning of the item.
12. Managing nausea and vomiting (whether or not I have had these problems in the past)	**Controlling vomiting or nausea, whether I have suffered from these before or not**	Dealing with nausea and vomiting (whether I have had these before or not)	"Dealing with" communicates a different meaning. "Managing" and "controlling" convey the same meaning in Arabic.
13. Coping with physical challenges	Facing physical challenges	**Coping with physical challenges**	Same as original item.
14. Trying to be calm while waiting at least one hour for my appointment	Trying to maintain calm while waiting for the appointment for more than one hour	**Trying to maintain calm while waiting for the appointment for at least one hour**	First translation is overly complicated.

**Note*. The bold items were selected for the CBI-BA. CBI-B, Cancer Behavior Inventory – Brief; CBI-BA, Cancer Behavior Inventory – Brief Arabic

Table 2

Expert panel responses to equivalence of the Arabic and English versions of the Cancer Behavior Inventory – Brief

Item	**Arabic and English versions are**				**TVI**
	similar	somewhat similar	somewhat different	different	
1. Maintaining independence	6	0	0	0	1.00
2. Maintaining a positive attitude	4	2	0	0	1.00
3. Maintaining a sense of humor	6	0	0	0	1.00
4. Expressing feelings about cancer	5	0	1	0	0.83
5. Putting things out of my mind at times	4	1	0	1	1.00
6. Maintaining activities (work, home, hobbies, social)	6	0	0	0	1.00
7. Trying to be calm throughout treatments and not allowing scary thoughts to upset me	5	0	1	0	0.83
8. Actively participating in treatment decisions	5	1	0	0	0.83
9. Asking physicians questions	6	0	0	0	1.00
10. Seeking social support	4	1		1	0.83
11. Sharing my worries or concerns with others	6	0	0	0	1.00
12. Managing nausea and vomiting (whether or not I have had these problems in the past)	5	1	0	0	1.00
13. Coping with physical challenges	5	1	0	0	1.00
14. Trying to be calm while waiting at least one hour for my appointment	5	1	0	0	1.00
Mean TVI*					**0.95**

**Note.* TVI, translation validity index

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Reliability Estimates for the Arabic Versions of the Cancer Behavior Inventory-Brief and the Functional Assessment of Cancer Therapy-Breast

--Manuscript Draft--

Manuscript Number:	JNM-D-15-00064R1
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Article Type:	Original Study
Keywords:	Arabic, cancer, cognitive interview, quality of life, reliability, self-efficacy for
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Abstract:	Purpose: The study aims were to (a) test reliability of the Arabic versions of the Cancer Behavior Inventory - Brief (CBI-BA) among general cancer patients and the Functional Assessment of Cancer Therapy - Breast (FACT-BA) in women with breast cancer, and (b) assess participant understanding of CBI-BA items. Methods: A cross-sectional design was used to assess preliminary evidence for internal consistency reliability of the CBI-BA and the FACT-BA in a community-dwelling sample of Arabic-speaking persons diagnosed with cancer. Participants were randomly selected for cognitive interview. Results: Cronbach's alphas were ≥.76 for the CBI-BA, .91 for the FACT-BA, and .43-

Abstract

Purpose: The study aims were to (a) test reliability of the Arabic versions of the Cancer Behavior Inventory – Brief (CBI-BA) among general cancer patients and the Functional Assessment of Cancer Therapy - Breast (FACT-BA) in women with breast cancer, and (b) assess participant understanding of CBI-BA items.

Methods: A cross-sectional design was used to assess preliminary evidence for internal consistency reliability of the CBI-BA and the FACT-BA in a community-dwelling sample of Arabic-speaking persons diagnosed with cancer. Participants were randomly selected for cognitive interview.

Results: Cronbach's alphas were ≥.76 for the CBI-BA, .91 for the FACT-BA, and .43-.89 for the FACT-BA subscales. Cognitive interviews revealed several CBI-BA items required revision.

Conclusion: The total CBI-BA and the FACT-BA scales have adequate internal consistency reliability estimates.

Keywords: Arabic, cancer, cognitive interview, quality of life, reliability, self-efficacy for coping

Introduction

Cancer is the fourth leading cause of death in Asian and African countries with Arabic as the official language (World Health organization [WHO], 2014). Cancer affects both physical and psychological aspects of people's lives (Moradian, Aledavood, & Tabatabaee, 2012; Stein, Syrjala, & Andrykowski, 2008), not only at the time of diagnosis and treatment but long afterwards as well (Drake, 2012). Arabic-speaking individuals may benefit from the availability of valid and reliable instruments to measure self-efficacy for coping (SEC) with cancer and quality of life (QOL) as SEC with cancer appears to predict QOL and survival (Yeung, Lu, & Lin, 2014). Figure 1 shows the relationship between SEC and QOL in people with cancer. Individual characteristics of knowledge, attitude, culture, and social influences determine responses to a cancer diagnosis; and coping abilities influence responses both to cancer diagnosis and treatment (Lev, 1997). High SEC leads to positive behaviors reflected in high QOL (Heitzmann et al., 2011), and low SEC influences coping behaviors in a negative manner, leading to poor QOL (Akin, Can, Durna & Aydiner, 2008; Yeung et al.).

Culture influences patient behaviors because it provides specific sources of information that are used to develop SEC (Bandura, 2002). Furthermore, culture shapes QOL because it frames how people function within their environment (Skevington, 2002). Arabic women with breast cancer differ from American and European women: Arabic women are diagnosed at a younger age and with a more advanced stage of cancer (Chouchane, Boussen, & Sastry, 2013; Sarhan, 2009). In particular, anxiety, fear, shyness, and stigma influence attitudes of Arabic women toward breast cancer and

coping (Al-Zaben, Sehlo, & Koenig, 2015; Amin, Almulhim & Almeqihwi, 2009; Donnelly et al., 2013; Sarhan, 2009).

Cross-cultural measures are essential for international research (Skevington, 2002; Sousa & Rojjanasrirat, 2011), and both research and clinical practice with Arabic populations would benefit from psychometrically sound instruments in the Arabic language. We recently translated the Cancer Behavior Inventory - Brief (CBI-B), a measure of SEC, into Arabic (Algamdi & Hanneman, in press). Others translated the Functional Assessment of Cancer Therapy - Breast (FACT-B), a measure of QOL, into Arabic (available at: http://www.facit.org/FACITOrg/Questionnaires). We did not locate published estimates of reliability for these Arabic translations; therefore, the purpose of the present study was to estimate reliability of the respective Arabic versions – the CBI-BA and the FACT-BA. Furthermore, because participant understanding of instrument items is essential to validity of the measurement, we used cognitive interviewing (Reeve et al., 2011) to assess participant understanding of the meaning of each item of the CBI-BA and revised items that were not understood in the intended way.

Methods

The study was approved as exempt from review by the University of Texas Health Science Center at Houston Committee for the Protection of Human Subjects. Verbal consent was obtained for study participation. A cross-sectional design was used to assess preliminary evidence for internal consistency reliability of (a) the CBI-BA in cancer patients and (b) the FACT-BA in a subsample of women with breast cancer. The assessment included two phases: the original instruments in Arabic were tested (Phase I), then revised and tested again with different research participants (Phase II). Participants

with any cancer diagnosis completed the CBI-BA, and those with breast cancer also completed the FACT-BA.

A subsample of participants was selected randomly for cognitive interview regarding their understanding of CBI-BA items. Before data collection, six numbers from 1-50 in Phase I and eight numbers from 1-50 in Phase II were selected randomly by computer. Participants with study identification codes that matched the randomly selected numbers were invited to participate in cognitive interview after they completed the study instrument(s). If a preselected participant declined interview, random numbers were regenerated based on the remaining numbers of participants to be recruited. The cognitive interview participants were asked the following questions about each item on the CBI-BA:

a. What did this question mean to you?

b. Why did you select this answer?

c. Can I rephrase this question to make it easier to understand? If so, how?

Participant responses to the questions were recorded manually for later discussion with a professional translator and CBI-BA item revision.

Sample and Setting

Arabic-speaking adults were recruited from the Greater Houston Metropolitan community with the snowball sampling technique (Polit & Beck, 2012) and flyers (with contact information) posted at mosques and housing complexes of Arabic- speaking residents. Eligibility criteria were age between 18 and 75 years, diagnosed with cancer, and able to read and write Arabic. Persons with cognitive or speech problems were excluded from study participation.

Instruments

The CBI-B is a 14-item, self-report, norm-referenced instrument developed to measure coping self-efficacy of cancer patients (Heitzmann et al., 2011). The CBI-B uses a 9-point, Likert-type scale (1 = not at all confident, 9 = totally confident). The sum of item scores indicates the level of SEC, with higher scores reflecting a stronger SEC than lower ones (Heitzmann et al.). It takes ≤ 5 minutes to complete the instrument. Heitzmann and colleagues reported adequate internal consistency estimates (Cronbach's alphas of .84 - .88) and evidence of construct validity. Factor analysis (N=735) supported the hypothesized four subscales of maintaining independence and positive attitude, participation in medical care, coping and stress management, and managing affect. Maintaining the original scale format, the CBI-B was translated into Arabic (Algamdi & Hanneman, in press); this published translation (CBI-BA) was used in Phase I of the present study. Demographic data of age, gender, and type of cancer diagnosis were added to the CBI-BA to describe the sample.

Based on participant feedback from cognitive interviewing in Phase I, two changes were made to the CBI-BA: the word "independence" in Item 1 was changed to "self-reliance" and the word "cancer" was replaced with "disease" throughout the questionnaire. The revised CBI-BA was used in Phase II.

The FACT-B is a 37-item, self-report, norm-referenced instrument developed to measure QOL of women with breast cancer (Brady et al., 1997). The FACT-B uses a 5-point, Likert-type scale, scored from 0 (not at all) to 4 (very much), and it takes about 10 minutes to complete. Brady and colleagues reported adequate evidence of internal consistency reliability (Cronbach's alpha = .90) and construct validity. Factor analysis

(*N*=295) supported the hypothesized five subscales of physical, social/family, emotional, and functional well-being, and additional concerns (breast cancer subscale). The Arabic version of the FACT-B (FACT-BA) was used in the present study.

Phase I data showed missing responses to FACT-BA items related to sexual issues: Item 7 of the Social Well-Being subscale ("I am satisfied with my sex life") and Item 4 of the Breast/Additional Concerns subscale ("I feel sexually attractive"). Responses to those two items were made optional (Revised FACT-BA) for Phase II testing.

Data Collection

The principal investigator (first author), an Arabic woman with Arabic as the native language and English as second language, collected the data. Upon contact by a potential participant, she arranged a meeting to review the study procedures, obtain informed consent, and administer the instrument(s) in a private area. The principal investigator remained with the participant to answer questions, according to standardized script in the study protocol; check the instrument(s) for missing responses upon completion; invite participation in cognitive interviewing of pre-selected participants; and conduct the interviews.

Data Analysis

Missing data was handled by imputation whereby the average individual response was used when the corrected item-to-total correlation was ≥ .3 (Donders, van der Heijden, Stijnen, & Moons, 2006). We considered optional items in the FACT-BA as missing values. Distribution of age and scale scores was assessed with histogram and the Kolmogorov-Smirnov normality test. Measures of central tendency and dispersion were

computed for the sample demographics and item and total scores for the CBI-BA and FACT-BA. Cronbach's alpha was computed, with $\alpha \geq .70$ considered evidence of adequate internal consistency (Nunnally & Bernstein, 1994).

For the cognitive interview data, CBI-BA items with more than three constructive comments were targeted for revision. Fewer than three comments, together with acceptable explanation of the response choice (interview question b), was considered acceptable semantic equivalence (Beck, Bernal, & Froman, 2003) of the CBI-BA with the CBI-B.

Results

A total of 97 participants completed the CBI-BA, 29 women with breast cancer also completed the FACT-BA, and 14 participants completed the cognitive interview. For Phase I, conducted between June and August 2014, 50 participants were recruited and 48 (96%) completed the instrument(s). Of these participants, 17 were women with breast cancer, 16 (94.1%) of whom completed the FACT-BA. Six persons participated in cognitive interviewing. For Phase II, conducted in September and October 2014, 55 participants were recruited and 49 (89%) met the eligibility criteria and completed the instrument(s); of those, 13 women with breast cancer completed the FACT-BA. Eight persons participated in cognitive interviewing. Participant demographics are shown in Table 1. Internal consistency reliability estimates are shown in Table 2; the table shows data for each testing phase and for the combined sample. Because the sample sizes for the FACT-BA were small and the differences between the original and revised versions were making responses to 2 of 37 items optional (in contrast to changes in the items per se), we tested Cronbach's alpha with the combined sample to see if larger sample size, and hence

greater variability, would impact alpha. For consistency in format of presentation, we presented the results in the same way for the CBI-BA in Tables 2 and 3.

CBI-BA scores were normally distributed with mean (± SD) = 91.5 (±15.4); minimum and maximum values were 52 and 121, respectively. Cronbach's alpha was .76 - .77, and mean inter-item correlation was .20. As expected, alpha did not change materially when both Phase I and Phase II samples were combined because the sample size of each phase was sufficiently large for a stable estimate of internal consistency.

Of the women with breast cancer, 14 (87%) and 10 (77%), for item 7 and item 4 respectively, were reluctant to respond to FACT-BA items of a sexual nature. FACT-BA scores were normally distributed, with and without the optional items. Mean values (± SD) were 97 (±25) and 93 (±24), with and without the optional items respectively; minimum and maximum values ranged from 44 to135 with the optional items and from 42 to 130 without the optional items. Cronbach's alpha was .91, and mean inter- item correlation was .23. Cronbach's alpha for the subscales varied from .43 - .89; reliability was estimated with exclusion and inclusion of the two sexual items (Table 2). The combined results from Phase I and Phase II testing reflect more stable estimates of Cronbach's alpha with a larger sample size than the separate phases.

Table 3 shows the results of cognitive interviewing for each phase and the combined sample. In Phase I interviews, two of six participants misunderstood the word "independent" in item 1 and most disliked the word "cancer" in item 4. In Phase II interviews, four of eight participants misinterpreted the meaning of items 5 ("putting things out of my mind at times") and 10 ("seeking social support"). Participants offered

comments for rephrasing of items; the comments (and number of participants who commented) are listed in the last column of Table 3.

Discussion

In this study, we tested preliminary evidence for reliability of the CBI-BA and FACT-BA after administration to an Arabic-speaking sample of community-dwelling patients in Houston, Texas who had been diagnosed with cancer. We also assessed the meaning of CBI-BA items through cognitive interviews. For general cancer patients, the internal consistency reliability estimate of the CBI-BA was acceptable and exceeded the a priori criterion of $\alpha \geq .70$ for a newly developed instrument (Nunnally & Bernstein, 1994). Heitzmann et al. (2011) reported higher levels (.84 - .88) of Cronbach's alpha with the original CBI-B. Cognitive interviews suggested some difficulties with participant understanding of CBI-BA items 5 and 10; poor understanding in the present sample may have affected responses and, thus, reliability of the instrument.

For women with breast cancer, the internal consistency reliability estimate of the FACT-BA ($\alpha = .91$) was acceptable and exceeded the a priori criterion of $\alpha \geq .70$ for a newly developed instrument. Making optional two items of a sexual nature did not change the reliability estimate of the total scale, but affected subscale reliability estimates.

The Physical Well-being subscale was not revised but the Cronbach's alpha increased from phase I to phase II, in which response to two items in other subscales were optional, and was similar to the Cronbach's alpha of the original instrument (Brady et al., 1997). The Social Well-being subscale produced unstable reliability estimates, which may have resulted from low response rate, small sample size, and the smaller

number of subscale items (from 8 to 7 with optional response). Nonetheless, inclusion of the optional items resulted in adequate internal consistency evidence of the Social Well-being subscale, with alpha coefficients equivalent to or higher than the original instrument testing results (Brady et al.). The Emotional Well-being and Functional Well-being subscales performed the same or better in this Arabic sample compared with the original instrument Cronbach's alphas (Brady et al.). Internal consistency evidence for the breast cancer subscale (Special Concerns subscale) improved when response to the sexual item was optional and exceeded the ≥ .70 a priori criterion for Cronbach's alpha and the reliability estimate for the original instrument (Brady et al.).

The FACT-BA subscales had acceptable internal consistency reliability estimates when two items that address sexual content were deleted from analysis. Sample size was marginally higher when the two items were treated as missing values. Therefore, it seems prudent to keep the items optional to be sensitive to the culture of Arabic women with breast cancer.

Cognitive interviewing is a time-honored method to assess semantic equivalence of the translated instrument with the original one (Beck, Bernal, & Froman, 2003). Our criteria for item revision were three or more constructive comments or wrong explanations. As shown in Table 3, comments and understanding varied between Phase I and Phase II testing, even though the population and methodology were the same. Examining the misunderstanding of CBI-BA items across testing phases shows that one or more interviewed participants misunderstood 7 of 14 items, albeit only items 5 and 10 achieved our a priori threshold for revision. Further refinement of the semantic equivalence is indicated.

Conclusions, Recommendations, and Implications for Practice

The CBI-BA has acceptable evidence of internal consistency reliability. Items 5 and 10 require revision to improve understanding of item meaning. Further cognitive interviewing is recommended to increase the semantic equivalence. The FACT-BA and it subscales have acceptable evidence of internal consistency reliability when the responses to two items of a sexual nature are included in computation of Cronbach's alpha. If those two items are deleted from the FACT-BA, error is unacceptable in the Social Well-being subscale.

Preliminary testing of the CBI-BA and FACT-BA provided adequate evidence of internal consistency reliability, making these instruments potentially worthy of clinical and research use with Arabic-speaking populations. Continued refinement of the semantic equivalence and testing for validity is in progress.

If further testing of these instruments shows adequate evidence of validity and reliability, the CBI-BA, which measures SEC with cancer, and the FACT-BA, which measures QOL, can be used with Arabic-speaking women with breast cancer to test the relations posited in Figure 1. The CBI-BA would be useful for testing SEC with cancer in Arabic-speaking men and women with any type of cancer.

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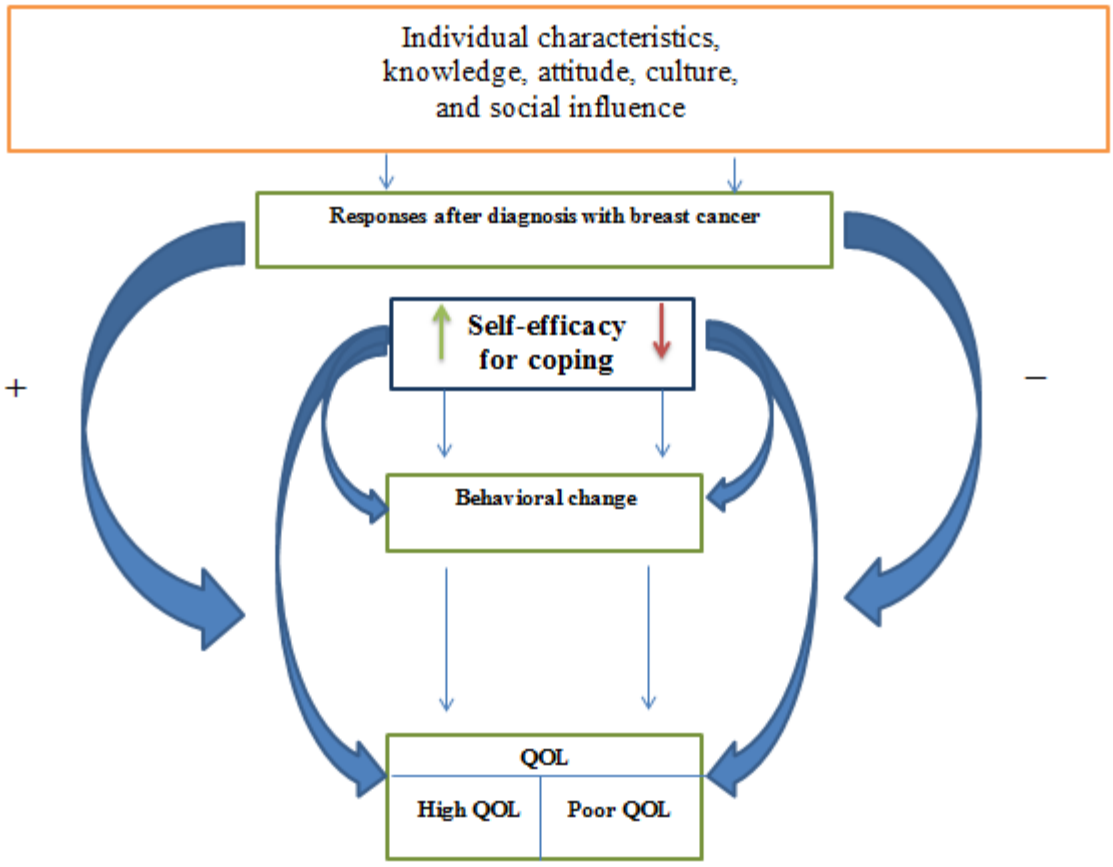

Figure1. The conceptual framework shows the relation between self-efficacy for coping (SEC) and quality of life (QOL) in patients with cancer.

Table 1

Demographic characteristics of the sample

	Phase I **n=48**	Phase II **n=49**	Combined **n=97**
Age (years)			
Mean (±SD)	45.9 (±13.3)	43.3 (±12.2)	44.6 (±12.7)
Gender			
Male (%)	18 (37.5%)	23 (46.9%)	41 (42.3%)
Female (%)	30 (62.5%)	26 (53.1%)	56 (57.7%)
	Diagnoses		
Breast	16	13	29
Digestive/gastrointestinal	9	11	19
Hematologic	7	8	15
Musculoskeletal	3	4	7
Respiratory/thoracic	4	2	6
Gynecologic	3	2	5
Multiple cancers	3	2	5
Endocrine/ neuroendocrine	-	3	3
Genitourinary	2	1	3
Neurologic	1	1	2
Otolaryngologic	-	1	1
Unknown primary	-	1	1
Total	48	49	97

Table 2

Cronbach's alpha coefficients for CBI-BA, revised CBI-BA, total FACT-BA and subscales and revised total FACT-BA and subscales

Scale	Phase I		Phase II		Combined samples	
CBI-BA	Original (n=48)		Revised (n=49)		CBI (N=97)	
	.76		.78		.77	
FACT-BA	Original without optional items (n=16)	Original with optional items (n=16)	Revised without optional items (n=12)	Revised with optional items (n=13)	FACT-BA without optional items (*N*=28)	FACT-BA with optional items (*N*=29)
Total scale	.91	.86	.91	.93	.91	.92
Physical Well-being Subscale	.78	-	.91	-	.86	-
Social Well-being Subscale	.71	.71	.43	.85	.68	.80
Emotional Well-being Subscale	.73	-	.75	-	.74	-
Functional Well-being Subscale	.82	-	.89	-	.87	-
Breast Cancer Subscale (Special Concerns)	.67	.67	.85	.77	.77	.71

Table 3

Cognitive interview findings for the Cancer Behavior Inventory – Brief, Arabic version

	Phase I		Phase II		Combined		
CBI-BA Items	Correct (n)	Wrong (n)	Correct (n)	Wrong (n)	Correct (n)	Wrong (n)	Recommended paraphrasing and comments (number of participants)
1. Maintaining independence	4	2	8	0	12	2	Depend on self, maintaining self-dependence, and extent to which you can maintain self-reliance (3)
2. Maintaining a positive attitude	6	0	7	1	13	1	Accept the disease and live with it, being positive and optimistic toward the illness, and extent to which you can maintain positive attitude (2)
3. Maintaining a sense of humor	6	0	8	0	14	0	Humor based on personality, use fun instead of humor, extent to which you can maintain sense of humor, and humor-like positive attitude (4)
4. Expressing feelings about cancer	6	0	7	1	13	1	Positive or negative feelings, and extent to which you can express feelings about the disease (2)
5. Putting things out of my mind at times	6	0	4	4	10	4	"Thing" must refer to the illness or treatment, Extent to which you can talk about what is on your mind from time to time (3), Don't see difference between items 4 and 5
6. Maintaining activities (work, home, hobbies, social)	6	0	8	0	14	0	"Social" must refer to social life, Extent to which you can maintain activities (work, home, hobbies, social) (2)
7. Trying to be calm throughout treatments and not allowing scary thoughts to upset me	6	0	8	0	14	0	Reconcile yourself with treatment and avoid negative thoughts, Extent to which you can be calm throughout treatments and not allow scary thoughts to upset me (2)

Table 3

Cognitive interview findings for the Cancer Behavior Inventory – Brief, Arabic version (continued)

CBI-BA Item	Phase I Correct (n)	Phase I Wrong (n)	Phase II Correct (n)	Phase II Wrong (n)	Combined Correct (n)	Combined Wrong (n)	Recommended paraphrasing and comments (number of participants)
8. Actively participating in treatment decisions	6	0	7	1	13	1	Make decisions regarding my treatment plan and extent to which you can actively participate in treatment decisions (1)
9. Asking physicians questions	6	0	8	0	14	0	Extent to which you can ask physicians questions (1)
10. Seeking social support	6	0	4	4	10	4	Looking for help from others, Extent to which you can seek help (2)
11. Sharing my worries or concerns with others	6	0	8	0	14	0	Extent to which you can share my worries and concerns with others (1)
12. Managing nausea and vomiting (whether or not I have had these problems in the past)	6	0	8	0	14	0	Change manage to prepare for or cope, Extent to which you can manage nausea and vomiting (2)
13. Coping with physical challenges	6	0	6	2	12	2	Challenges might be changed to difficulties or problems, Overcome the sense of helplessness toward any daily activity such as exercise, Extent to which you can cope with physical challenges (3)
14. Trying to be calm while waiting at least one hour for my appointment	6	0	8	0	14	0	Accept long time waiting for my appointment, Extent to which you can be calm while waiting at least one hour for my appointment (2)

Appendix C

Factor Analysis Results Not Included in the Manuscript.

Table C 1

Exploratory factor analysis for 14-item Cancer Behavior Inventory-Brief Arabic with orthogonal rotation in general cancer patients (N=438)

	Factor		
Item Number	1	2	3
2	.692	.256	-.056
1	.679	.189	-.098
13	.640	-.026	.105
6	.639	.139	.037
7	.585	.172	.064
3*	.518	.358	-.024
14	.452	-.035	.166
8*	.402	.331	.071
5	.046	.554	.276
4	.155	.538	.215
9*	.349	.363	.228
11	-.027	.323	.623
10	-.003	.160	.514
12*	.373	.036	.381

Note. * Cross-loaded item.

Table C 2.

Exploratory factor analysis for 14-item Cancer Behavior Inventory-Brief Arabic with oblique rotation in general cancer patients (N=438)

Item Number	Factor		
	1	2	3
13	.714	-.196	.099
1	.669	.073	-.155
2	.664	.141	-.125
6	.653	.004	-.005
7	.585	.052	.017
14	.517	-.171	.168
3*	.444	.296	-.109
12*	.426	-.102	.377
8*	.334	.278	-.004
5	-.109	.590	.170
4	.010	.555	.109
9*	.279	.304	.153
11	-.084	.289	.578
10	-.013	.111	.497

Note. * Cross-loaded item.

Table C 3

Exploratory factor analysis for 12-item Cancer Behavior Inventory-Brief Arabic with orthogonal rotation in general cancer patients (N=438)

Item Number	Factor	
	1	2
2	.742	.066
1	.719	-.014
6	.646	.080
7	.596	.143
3	.588	.153
13	.581	.048
8	.453	.215
9*	.406	.395
12*	.318	.296
11	-.008	.699
10	-.024	.569
4*	.265	.381

Note. * Cross-loaded item.

Table C 4

Exploratory factor analysis for 14-item Cancer Behavior Inventory-Brief Arabic with oblique rotation in women with breast cancer (n=168)

Item Number	Factor			
	1	2	3	4
2	.801	-.023	.114	-.056
6	.734	-.135	-.159	.208
3	.679	.149	-.079	.008
1	.649	-.043	.102	-.063
13	.548	.002	.120	-.059
7	.513	.004	.180	-.018
14	.506	.018	.079	-.111
12*	.361	.256	-.142	.086
4	.205	.796	-.105	-.053
5	-.185	.672	.196	-.078
8	.167	.006	.776	.066
9*	.062	.209	.368	.173
10	.021	-.172	.097	.733
11	-.168	.308	.046	.532

Note. * Cross-loaded item.

Table C 5

Exploratory factor analysis for 14-item Cancer Behavior Inventory-Brief Arabic with orthogonal rotation in women with breast cancer (n=168)

Item Number	Factor		
	1	2	3
2	.806	.024	.278
3	.676	.197	.066
1	.670	-.022	.210
6	.645	.134	.008
7	547	.061	.279
13	.516	.044	.250
12*	.343	.297	.013
11	-.089	.777	.079
10	.057	.426	.128
4*	.297	.418	.147
8	.316	.203	.693
9*	.140	.387	.507

Note. * Cross-loaded item.

Table C 6

Exploratory factor analysis for 12-item Cancer Behavior Inventory-Brief Arabic with oblique rotation in women with breast cancer (n=168)

Item Number	Factor		
	1	2	3
2	.790	-.100	.125
3	.737	.134	-.114
6	.725	.085	-.171
1	.664	-.122	.082
7	.498	-.042	.191
13	.476	-.051	.165
12*	.385	.274	-.101
11	-.119	.783	.049
10	.018	.402	.102
4*	.280	.371	.063
8	.068	.029	.739
9	-.048	.272	.543

Note. * Cross-loaded item.

Table C 7.

Exploratory factor analysis for 37-item Functional Assessment of Cancer Therapy-Breast Arabic with orthogonal rotation in women with breast cancer (n= 167)

Item	Factor										
	1	2	3	4	5	6	7	8	9	10	11
func2	.812	-.007	.123	.295	.051	-.149	-.041	.028	.217	-.073	-.031
func1	.748	-.137	.050	.291	.187	-.078	.097	.186	.138	-.014	.045
phys3r	.729	.089	-.236	-.084	.027	.053	.045	-.012	.149	.076	.059
phys4r	.718	.079	.034	-.265	-.036	.086	.119	.200	-.004	.058	-.157
phys1r	.671	.145	-.053	-.031	-.033	.228	.054	-.050	-.075	.283	.327
phys6r	.669	.178	.208	.025	.052	.263	-.018	-.096	-.186	-.018	.284
phys2r	.569	.176	-.027	-.129	.096	.078	.332	-.034	-.122	.252	-.021
func3*	.568	.065	.170	.319	.233	.185	.369	-.115	.112	-.280	-.142
emotion6r	.190	.806	.081	.080	.112	.180	.104	-.028	-.035	.170	.078
concern6r	.080	.740	-.017	.037	-.274	-.171	.073	.190	-.012	-.060	-.030
concern5r	-.054	.683	-.138	-.068	.168	-.011	.123	.176	.147	-.328	.051
concern7r	.336	.660	.194	.020	.254	.221	.079	-.037	.270	-.044	-.011
emotion5r*	-.074	.528	.149	.143	.506	.121	.031	.001	-.025	-.019	.060
concern8r*	-.092	.508	.248	.202	.115	-.033	-.044	.447	-.022	-.172	.143
func4*	.185	.447	.113	.182	.366	.124	.054	-.122	-.204	-.196	-.096
concern4*	.024	.344	-.249	.225	.093	.026	.095	-.295	.051	-.029	-.315
social5	.036	.022	.888	-.089	.066	.045	.000	.029	-.086	.040	.029
social4*	.127	.016	.673	.506	-.082	-.077	.186	.062	-.040	.154	.062
social6	-.111	.198	.565	.019	-.032	.197	.304	.096	.126	.151	.168
social2*	-.121	.024	.538	.454	-.030	.194	.041	.111	.034	-.043	-.137
func7*	.355	.078	.497	.275	.289	.120	.400	-.349	.082	-.225	-.154
social3	-.204	.320	.214	.684	.036	.088	.141	-.164	-.055	.070	.039
social1	.078	.019	-.005	.612	.009	.175	.062	.079	.091	-.042	-.058
concern9*	.214	.003	-.214	.328	.199	.207	-.025	-.018	.119	-.191	.077
emotion2	.074	.097	-.054	-.011	.768	.057	.028	.037	.059	-.054	.016
phys7r*	.502	-.022	-.067	.031	.525	.092	.211	.348	-.177	.085	.109
social7*	.204	.098	.452	.047	.479	-.224	.081	-.213	.171	.204	.076
emotion4r	.159	.080	.140	.198	-.110	.834	.122	.046	.278	.039	.162
emotion3r	.016	-.005	-.018	.093	.131	.689	.042	-.040	-.054	-.011	-.019
emotion1r*	.339	.293	.251	.179	.085	.512	.000	-.084	.152	.156	-.112
func5	.210	.180	.196	.142	.014	.103	.913	.067	.041	.114	-.008
func6	.266	.170	.149	.446	.307	.016	.544	-.220	-.087	-.092	.071
concern10r	.279	.293	.070	-.004	.027	-.045	.005	.624	.185	.065	-.023
concern3r	.094	-.034	-.123	.097	.040	-.071	-.017	.175	.564	.189	.340
concern2r	.034	.053	.032	.019	.006	.104	.013	-.003	.431	-.015	-.050
concern1r	.136	-.134	.136	-.029	-.013	.047	.057	.028	.083	.546	-.032
phys5r*	.491	.241	.168	-.074	.263	.145	.058	.001	.186	-.259	.662

Note. *Cross-loaded item; r, reverse-scored.

Table C 8

Exploratory factor analysis for 37-item Functional Assessment of Cancer Therapy-Breast Arabic with oblique rotation in women with breast cancer (167)

Item	Factor										
	1	2	3	4	5	6	7	8	9	10	11
func2	.964	-.034	.056	.218	-.128	-.231	-.192	.120	.148	-.032	.048
phys4r	.829	.081	.095	-.346	-.093	.048	.081	.296	-.055	.072	-.138
func1	.821	.215	-.024	.251	.105	-.121	.005	.263	.069	.035	.075
phys3r	.816	.089	-.313	-.110	-.069	-.012	-.009	.007	.119	.093	.092
phys1r	.720	.103	-.129	.021	-.147	.125	-.006	-.104	-.120	.258	.278
phys6r	.698	.090	.187	-.014	-.146	.141	-.156	-.134	-.277	-.099	.336
phys2r	.558	.144	-.089	-.174	.044	-.010	.310	-.015	-.141	.282	-.090
func3	.468	-.077	.038	.133	.036	.108	.252	-.061	.050	-.274	-.020
concern6r	.168	.887	-.070	.057	-.418	-.261	.084	.273	-.047	-.146	-.057
emotion6r	.111	.827	-.031	.080	.045	.051	.013	.037	-.054	.179	-.017
concern5r	-.191	.724	-.212	-.143	.116	-.061	.135	.241	.129	-.401	.142
concern7r	.203	.624	.117	-.120	.172	.114	-.055	.073	.256	.003	.044
func4*	.100	.389	.042	.099	.295	.035	-.098	-.055	-.260	-.201	-.095
social5	-.037	-.071	1.073	-.247	.019	-.009	-.100	.088	-.113	.050	.087
social4*	.123	-.061	.649	.479	-.211	-.150	.108	.112	-.084	.177	.008
social6*	-.311	.110	.586	-.069	-.069	.153	.329	.105	.138	.154	.176
social2*	-.165	-.057	.549	.419	-.069	.200	-.043	.200	-.003	-.004	-.164
concern4*	.014	.385	-.411	.198	.045	-.023	.020	-.244	.072	.034	-.365
func7*	.173	-.090	.405	.009	.079	.008	.251	-.317	.053	-.197	-.012
concern9*	.171	-.072	-.349	.343	.153	.205	-.094	-.020	.082	-.189	.116
social3	-.292	.274	.026	.740	-.061	.016	.057	-.157	-.071	.090	-.072
social1	.081	-.037	-.154	.677	-.042	.182	.001	.127	.052	-.005	-.121
emotion2	-.147	-.024	-.096	-.093	.954	.057	-.061	.109	.067	.064	.014
phys7r	.414	-.147	-.099	.036	.646	.083	.177	.416	-.238	.138	.028
emotion5r	-.276	.462	.077	.095	.572	.057	-.079	.077	-.034	.036	.014
social7*	.056	.008	.436	-.106	.502	-.323	-.049	-.158	.204	.342	.094
emotion4r	.000	-.066	.059	.195	-.176	.845	.091	.023	.256	.038	.186
emotion3r	-.120	-.136	-.058	.105	.174	.724	-.009	-.057	-.075	.006	-.054
emotion1r*	.283	.212	.198	.127	.045	.460	-.152	.003	.131	.248	-.156
func5	-.036	.068	.035	.015	-.107	.028	1.025	.062	.044	.102	-.026
func6*	.070	.028	-.067	.337	.136	-.101	.485	-.247	-.121	-.105	.088
concern10r	.332	.334	.116	.022	.110	-.026	.021	.798	.143	.107	-.075
concern8r*	-.144	.517	.261	.223	.115	-.057	-.072	.558	-.086	-.225	.130
concern3r	.025	-.043	-.215	.140	.093	-.057	.037	.169	.611	.262	.369
concern2r	-.033	.040	-.002	-.053	.007	.117	.003	.042	.467	.052	.022
concern1r	.155	-.144	.150	.024	.113	.050	.059	.064	.129	.692	-.194
phys5r	.312	.106	.109	-.190	.066	.027	-.004	-.092	.126	-.390	.890

Note. *Cross-loaded item; r, reverse-scored.

Table C 9

Exploratory factor analysis for 27-item Functional Assessment of Cancer Therapy-Breast Arabic with orthogonal rotation in women with breast cancer (n=167)

Item	Factor					
	1	2	3	4	5	6
phys6r	.707	.064	.365	.162	.016	.003
phys1r	.702	.142	.118	-.030	-.063	-.092
phys4r	694	.174	.194	.070	-.101	-.037
phys7r*	.650	.133	.055	-.010	.111	.488
phys3r	.617	.095	.072	-.042	.097	-.003
phys2r	.577	.201	.247	-.050	-.108	.215
phys5r	.568	.113	.323	.041	.120	.044
func7	.096	.792	.184	.316	.065	.053
func3	.278	.786	.143	.146	.072	.043
func4	-.016	.675	.147	.041	.057	.157
func2	.437	.666	-.183	.161	.132	-.118
func6	.211	.663	.242	.169	.126	.089
func1*	.517	.581	-.123	.112	.126	-.077
func5*	.356	.515	.159	.331	-.011	.020
emotion4r	.307	.035	.654	.018	.216	-.236
emotion1r	.388	.203	.653	.112	.059	-.049
emotion6r	.173	.065	.644	.112	-.068	.111
emotion5r	.033	.106	.562	. 207	-.039	.339
emotion3r	.229	.185	.506	-.018	.204	.074
social5	.020	.044	.007	.789	.046	.024
social4	.031	.204	.010	.704	.062	-.078
social2	-.064	.040	.081	.559	.281	.035
social7	.067	.267	.032	.502	.096	.136
social6	.031	.124	.247	.481	.077	-.062
social1	.103	.153	.162	.209	.700	-.006
social3	-.061	.124	.002	.219	.646	.098
emotion2*	.008	.344	.132	-.012	.181	.384

Note. *Cross-loaded item; r, reverse-scored.

Appendix D

Translation certificates

TransLangCo
The Language of Your Choice!

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Fax: 713-464-0166
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msanford@translangco.com

February 17, 2014

Re.: Cancer Behavior Inventory - Back Translation [Document 8973]

I, Melly Sanford, representative of TransLangCo, ATA corporate member 229112, hereby declare that we are a professional translation/editing company experienced in translating/editing documents and have translated, proofread, checked, and confirmed that this is a true and accurate translation of the attached document, "Cancer Behavior Inventory- Back Translation," to the best of our knowledge. The translator of this document is Mueen (Ahmad Talal) Moh'd Issa, who lives in Jordan. The original is a 1-page Arabic document. The translation is a 1-page English document.

Signed this 17th day of February 2014, in the City of Houston, Texas.

Melly Sanford
Translangco
9225 Katy Freeway, Suite 114
Houston, TX 77024
Tel: 713-464-8474

The State of Texas
County of Harris

Before me, on this day, personally appeared Melly Sanford, known to me (or proved to me under oath or through Texas Drivers License) to be the person whose name is subscribed to the forgoing instrument, and acknowledged to me that she executed the same for the purpose and consideration therein expressed.

Given under my hand and seal of office this 17th day of February 2014.

Jean M. Stark
Notary Public in and for the State of Texas
My commission expires: November 2, 2016

JEAN M. STARK
MY COMMISSION EXPIRES
November 2, 2016

TransLangCo
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February 24, 2014

Re.: Cancer Behavior Inventory [Document 9000]

I, Melly Sanford, representative of TransLangCo, ATA corporate member 229112, hereby declare that we are a professional translation/editing company experienced in translating/editing documents and have translated, proofread, checked, and confirmed that this is a true and accurate translation of the attached document, "Cancer Behavior Inventory," to the best of our knowledge. The translator of this document is Tamer A. Mekhimar, who lives in Qatar. The original is a 1-page English document. The translation is a 1-page Arabic document.

Signed this 24th day of February 2014, in the City of Houston, Texas.

Melly Sanford
Translangco
9225 Katy Freeway, Suite 114
Houston, TX 77024
Tel: 713-464-8474

The State of Texas
County of Harris

Before me, on this day, personally appeared Melly Sanford, known to me (or proved to me under oath or through Texas Drivers License) to be the person whose name is subscribed to the forgoing instrument, and acknowledged to me that she executed the same for the purpose and consideration therein expressed.

Given under my hand and seal of office this 24th day of February 2014.

Jean M. Stark
Notary Public in and for the State of Texas
My commission expires: November 2, 2016

JEAN M. STARK
MY COMMISSION EXPIRES
November 2, 2016

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Appendix E

Curriculum Vitae

CURRICULUM VITAE

NAME: Maaidah Mouid Algamdi, RN, BSN, MSN
PRESENT TITLE: Full time student, PhD program
CONTACT:
Phone: (206) 458-2250 / 0560091866
Email: Maaidah.Algamdi@uth.tmc.edu
PLACE OF BIRTH: Tabuk, Saudi Arabia
CITIZENSHIP: Saudi Arabia

UNDERGRADUATE EDUCATION:

2003 BSN, King Abdul-Aziz University

GRADUATE EDUCATION:

2016 PhD in Nursing, University of Texas Health Science Center at Houston
2010 MSN, Community Health Nursing, King Saud University –Riyadh

LICENSURE:

2003-2005 Registered Nurse, Saudi Arabia

EXPERIENCE:

2010-2012 Lecturer, Fundamentals of Nursing course, College of Applied Medical Sciences, Department of Nursing, University of Tabuk
2010-2012 Academic Affairs Officer, University of Tabuk
2005–2007 Tutor, Nursing Institute, University of Tabuk
2005-2006 Clinical instructor, Medical Surgical Basic Adult Nursing course, North West Armed Forces hospital diploma program -Tabuk.
2004-2005 Registered Nurse one (Scrub Nurse) in operating theater, North West Armed Forces Hospital- Tabuk
2003-2004 Surgical Ward Registered Nurse, North West Armed Forces Hospital – Tabuk

PROFESSIONAL ORGANIZATIONS:

2012-current Saudi Critical Care Society, Golden member
2013-current Saudi Nursing Regulation, member
2015-current Sigma Theta Tau International, member

HONORS AND AWARDS:

2005 Honor for outstanding contribution in nursing department, North West Armed Forces Hospital- Tabuk

SERVICE TO THE COMMUNITY:

2012 Active participant in Breast Cancer Awareness Program, Zahra Breast Cancer Association –Tabuk

2011 Provided lecture on orphan health at the King Abdul-Aziz Charity Center as part of the Health Education Department, Ministry of Health-Tabuk

2009 Provided health education program in ALRabuah PHC (Breast Feeding)-Riyadh

2008 Participated in school heath unit at secondary school healthy diet education program-Riyadh

2003 Assistant for international Diabetic Days Workshop King Abdul-Aziz University Hospital-Jeddah.

2002 Assistant for international Diabetic Days Workshop King Abdul-Aziz University Hospital-Jeddah

2001 Assistant for international Diabetic Days Workshop King Abdul-Aziz University Hospital-Jeddah

2001 Assistant for Objective Subjective Clinical Exam (OSCE) for medical students. King Abdul-Aziz University Hospital-Jeddah.

TEACHING EXPERIENCE:

Theory:

2010-2011	Community Health Nursing, 3 credits
2010-2011	Health Education, 2 credits
2010-2012	Evidence Based Nursing Practice, 1 credit
2010-2012	Documentation Skills, 2 credits
2010-2011	Communication and Interpersonal Skills, 1credit

Practical:

2011-2012	Fundamentals of Nursing, 3 credits
2010-2011	Medical Surgical Nursing, 3 credits
2010-2011	Community Health Nursing, 3 credits

Clinical:

2010-2011	Medical Surgical Nursing, 3 credits
2010-2011	Community Health Nursing, 3 credits

CERTIFICATIONS:

2012 University of Washington, Bothell Accelerated Intensive English language program
2012 Critical Care Nursing, course certification Saudi Council of Health Specialties
2011 Oncology Seminar completion, Saudi Council of Health Specialties
2011 Nursing Specialist Certification, Saudi Council of Health Specialties
2011 Basic life support provider, Saudi Council of Health Specialties
2004 Basic regional anesthesia course for surgeons, Saudi Council of Health Specialties
2004 Infection prevention and control course, Saudi Council of Health Specialties

PUBLICATIONS:

A. Algamdi, M. M., & Hanneman, S. K. (in press). Development of an Arabic translation of the Cancer Behavior Inventory-Brief. *Journal of Nursing Measurement* (Accepted October 7, 2015)
B. Algamdi, M. M., & Hanneman, S. K. (in press). Reliability estimates for the Arabic versions of the Cancer Behavior Inventory-Brief and the Functional Assessment of Cancer Therapy-Breast. *Journal of Nursing Measurement* (Accepted December 16, 2015)
C. Algamdi, M., Armstrong, T., Engeberston, J., & Wardell, D. (In review) How do women's social roles influence coping with breast cancer? Cultural and religious contexts. *Oncology Nursing Forum*

PRESENTATIONS:

Algamdi, M. M., & Hanneman, S. K. (April 8, 2016). Development and reliability estimates of the Arabic version of the Cancer Behavior Inventory-Brief. Paper presented at Sigma Theta Tau International Zeta Pi Research Day 2016, University of Texas Health Science Center at Houston- School of Nursing, Houston, Texas.

PROFESSIONAL SERVICE:

Manuscript Reviewer, *Journal of Nursing Measurement*, 2015 – present